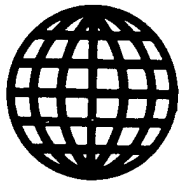


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USSR: Life Sciences

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SCIENCE & TECHNOLOGY
USSR: LIFE SCIENCES

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EYESIGHT TRAINER FOR PILOTS

Moscow IZOBRETATEL I RATSIONALIZATOR in Russian No 12, Dec 86 p 22

[Article by Ye. Kuznetsov, press center editor, Ministry of Civil Aviation:
"An Eyesight Trainer"]

[Text] Specialists at the State Civil Aviation Scientific Research Institute have found that each pilot has his own optimum level of brightness at which his eyesight is keenest. They have established that any decrease or increase in brightness [from that optimum level] leads to a decrease in visual acuity. It has also been found that after a cold, or when the eyes have been strained, or there is some other health problem the resolving capacity of the eyes diminishes and a pilot must substantially increase the level of illumination to maintain his normal visual acuity.

Could the perceptual capacities of the eyes be increased? Indeed, the eyesight can be trained. Varying techniques have been developed, including those requiring the use of special ophthalmological instruments. For example, various types of adaptometers have been adapted for this purpose. These utilize artificial illumination conditions and training can occur only for near distances; in addition, they are rather complicated and require the participation of a specially trained individual.

The staff of the division of aviation medicine research have proposed their own improved method for increasing visual acuity.

You are seated at a distance of 5 meters from an eyechart and you yourself switch on the "Sveton" brightness regulator which controls the illumination of the chart. A 150-200 watt light bulb is used. Then you determine for yourself the smallest line of the chart which you can make out clearly and again return to the initial illumination. While this is happening, an indicator on a dial on the "Sveton" automatically records the point where increasing or decreasing the illumination blurs the line. A training session is considered successful when, after returning to the initial level of illumination, a subject can read one or two lines more than at the beginning of the exercise. The entire training program entails 5-15 sessions. After completing the program, the typical subject shows an increased capacity to see objects clearly under reduced illumination, while near-sighted subjects show a noticeable increase in visual acuity.

Its capacity for smoothly increasing the level of illumination and the wider interval between the maximum and the minimum illumination, allows this device to be used by individuals with any degree of visual acuity. Training can even take place at home. It is not difficult to construct such a trainer yourself. To do so you need to acquire a "Sveton" thyristor light regulator and construct an eyechart and the means for illuminating it -- a simple matter. What is more, the staff of the division of aviation medicine research of the State Civil Aviation Scientific Research Institute would be happy to give you any advice you need.

9285

CSO: 1840/475

APPRAISAL DEVICE FOR AGRICULTURE SLATED FOR PRODUCTION

Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 11, Nov 86 p 2

[Unattributed article under the "Science" rubric: "Prognosis by Instrument"]

[Text] Staff personnel at the Scientific Research Institute for Applied Physics Problems, Belorussian State University imeni V. I. Lenin, have developed a system which is capable of surveying fields and revealing signs of development of plants and diseases in them linked to changes in the pigment apparatus.

Traditional methods of visual observation of farmland, in conjunction with laboratory analysis of a specimen, are very labor intensive. Consequently, there is often a delay in decisions made at farms to treat or sow a crop. The key virtue of the electronic "Agronom" is its speed and accuracy. For example, it is possible to use the instrument's indicators to determine sowing depth for winter crops, the growth stage of crops, and their needs for fertilizer, as well as to evaluate the extent of weed damage to a field. Manufacture of such devices is slated to begin early next year at the Minsk Agropribor Scientific Industrial Association.

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12976/9835

CSO: 1840/318

PRODUCTION AND USAGE OF LYSINE

Kiev RABOCHAYA GAZETA in Russian 27 Feb 87 p 1

[Article by I. Shkolnik, Deputy Chief Engineer, Tripolsk Biochemical Plant, Kiev Oblast]

[Abstract] This article reports that the Tripolsk Biochemical Plant (near Kiev) is the nation's largest producer of the amino acid lysine, which significantly activates the conversion of plant protein to animal protein when added to animal feeds. In spite of its great promise, and the availability of the large Tripolsk Plant for its production, lysine is not sufficiently used by agriculture in the Ukraine. The plant is forced to search independently for consumers for its product in neighboring republics. The author calls for installation of 50-60 cubic meter tanks for lysine at all combined-feed plants in the UkSSR to facilitate further utilization of the valuable product.

6508/9835

CSO: 1840/1059

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ACHIEVEMENTS AND PROSPECTS OF BIOTECHNOLOGY IN MICROBIOLOGY
AND IMMUNOLOGYMoscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in
Russian No 6, Jun 86 (manuscript received 2 Jan 86) pp 3-9[Article by A. A. Vorobyev, in section titled "Implementation of
the Decisions of the XXVII Congress of the CPSS"]

[Text]Scientific and technical progress would be impossible without fundamentally new developments in any given area of knowledge, since new approaches and principles used for solving applied problems are formulated on their basis. The beginning of the last twenty-five years of our century has witnessed rapid, manifold development in biology and in our knowledge of the molecular mechanisms of life processes and of the functioning of living systems. The advances recorded by contemporary biology are primarily associated with the development of physico-chemical biology, genetics and genetic engineering, immunobiology, and biotechnology. Such advances have enabled us to find ways of controlling many biological processes in bacterial cells and animal cells; create hitherto unknown microorganisms or hybrids of animal and vegetable cells; and use the biological processes in cells for the practical solution of problems associated with the derivation of many products badly needed in the national economy, medicine, and veterinary science.

The newly formed science of biotechnology is, in essence, a branch of production that, on the basis of or with use of biological processes that take place in the body or in bacterial, animal, or vegetable cells, is developing and implementing industrial-scale derivation of valuable products essential to human life. There is not yet, in our opinion, a precise definition of biotechnology. Biotechnology is sometimes reduced to a microbiological branch of production, other times to genetic engineering. It is sometimes seen as the combined use of biochemistry, microbiology, and engineering sciences as applied to industrial technology with a preoccupation with

microorganisms and cell cultures. We will, therefore, adhere to a definition that places biotechnology in a division of science that, in classifying and studying the use of single-cell living systems (bacteria, fungi, animal and plant cells) in the controlled biosynthesis of products and substances that have a specific chemical composition and specific properties, is developing the technology for deriving these substances on an industrial scale for subsequent use in the national economy [1].

That definition pertains to general biotechnology. Special, separate lines of biotechnology, however, exist independently, such as the biotechnology of microbiological synthesis, immunobiotechnology, the biotechnology of cell cultures, and the biotechnology of hormones and enzymes. Naturally, new divisions and lines will appear as biotechnology evolves.

At the present time, there is, perhaps, no biological or medical discipline that would not attempt to examine its problems from the standpoint of biotechnology, since every one of them has as its ultimate goal the solution of applied, practical problems, and biotechnology pertains precisely to a number of sciences that have a clearly defined practical orientation. Attesting to this are the literally triumphant successes biotechnology has registered in the past 10-15 years in microbiological synthesis, in the derivation of its products by means of genetic engineering, and the introduction of such products into industry, agriculture, and medicine. It is no accident that it is written in the new edition of the Program of the CPSS that biotechnology will be used on an ever wider scale.

This can be illustrated with well-known examples that enable one to judge how widespread the principles of biotechnology are. The microbiological industry, which is based on the use of microorganisms and their products for the production of a wide assortment of substances that are quite essential to human beings, was created as an independent branch of the national economy with its own industrial enterprises, its own technology, its own equipment, its own instruments, its own staff of specialists. It produces large quantities of feed proteins, antibiotics, amino acids, vitamins, enzymes, alcohols, organic acids, protective agents for plants, immune preparations (vaccines, allergens, diagnostic agents, interferons, modulators, etc.), and immunoglobulins, as well as hormones and other biologically active peptides. These products are used in agriculture and animal husbandry, in the food and light industries, in medicine and veterinary science, in environmental protection, and in several branches of industry. Without these products it would be impossible to solve many major problems associated with providing the population food and raw materials or to effectively prevent and treat many disorders in humans or in farm animals.

That is why today modern biotechnology serves as the foundation for scientific and technical progress in agriculture and medicine and has strategic importance for the growth of the national economy.

In the context of worldwide scientific and technical progress, biotechnology occupies a leading position along with machine building, power engineering, electronics, and chemistry [6].

As it has been pointed out, biotechnology has, in an extremely short period of time, gone from the cloning of the first gene in 1973 to the industrial development and implementation of genetic engineering in the derivation of biologically active preparations like medical preparations. These stages have been covered by I. H. Gibbons [8], who also reports that roughly 1,200 different organizations in 27 capitalist countries are actively engaged in biotechnology at this time, including more than 300 industrial firms, more than 200 biotechnology companies, and some 400 laboratories.

Work is being conducted within 150 commercial ventures. The leaders in the field of biotechnology in the capitalist countries are the United States, Japan, England, France, and the Federal Republic of Germany. A great deal of attention is being devoted to the development of fundamental sciences. Thus, in the United States, 5,442 projects costing a total of \$644 million were carried out in genetics over a five-year period (from 1978 through 1982), 2,310 projects costing \$220 million were carried out in hybridomas over a three-year period (from 1980 through 1982), during which time 138 projects costing \$9 million were carried out in enzyme immobilization. In 1982 alone, all branches of biotechnology accounted for 3,541 projects totalling \$380 million.

A great deal of attention is being devoted to biotechnology in our country, too. In 1985, the Central Committee of the CPSS and the Council of Ministers of the USSR issued a resolution on the future growth of biology and biotechnology. It specified large-scale measures for accelerating the growth of these important scientific sectors; for applying research findings to industry, agriculture, and health care; and for more fully satisfying the needs of the country in terms of progressive biotechnology products that have significance for the national economy.

Genetic engineering has made a substantial contribution to the growth of biotechnology. It has already made possible, on an advanced level, the derivation of strains of microorganisms

and hybrid cells that have new properties and can be used for obtaining target products.

Genetic engineering has been used to obtain lines that produce microorganisms (primarily, intestinal bacilli, pseudomonadeae, and yeast) that manufacture many biological protein substances. The number of such substances has now reached 60. Among them are substances that are widely known and essential to practice like insulin; interferons (alpha, beta, and gamma); human albumin; interleukin-1 and -2; essential amino acids; human and cattle growth hormone; immunoregulatory peptides (tuftsin, myelopeptides, etc.); antigens for influenza, foot and mouth disease, herpes, and hepatitis A and B; and other biologically active substances. Reports on the achievements of genetic engineering in this area are given in the domestic literature [2,3,5].

The principal site of biotechnology is the bacterial, animal, or plant cell. As mentioned above, biotechnology uses either cells as such or the biological processes that take place in the cells and lead to the derivation of substances essential to man. We know that hundreds of biochemical processes take place in a cell, providing it with its vitality. They include, among others, metabolic and enzymatic processes; the production and secretion of physiologically active substances essential for the existence of the body as a whole and substances that perform regulatory functions; and the synthesis of structural cell elements that have unique physical or chemical properties of one kind or another.

Consequently, the cell itself and the products of its activity can be the site of biotechnology for the industrial derivation of a wide range of extremely valuable products used in various spheres of the national economy and medicine. The assortment of these products is growing even larger, what with the existence of a huge number of types of single-cell organisms and the large variation of animal and plant cells, all of which differ from one another in their metabolic processes or in the nature of manufactured "product." For example, the microorganisms on the Earth alone number some 100,000, and biotechnology is using only about 100 types.

The possibilities associated with the use of animal and plant cells in biotechnology are still far from exhausted. Such use is only beginning to achieve industrial scale (for example, the cultivation of ginseng cells, the derivation of viruses and an antigen in animal-cell cultures, the cultivation of animal

and plant cells that produce physiologically active substances for obtaining preparations).

In the table, we have tried to systematize data that involve the processes in the cell or the organism that can be modeled as "technological processes" that are used in biotechnology, the products that can be obtained on the basis of these processes, the most efficient means or principles for obtaining the products, and, finally, the successes achieved with a given method and its prospects for the near future.

From this analysis, several conclusions can be drawn:

1. Biotechnology that is based on microorganisms and the immunological processes that take place in the immune components of cells can solve and does solve extremely important and pressing problems associated with the derivation of target products essential to the national economy and medicine. Underlying the processes used by biotechnology are metabolic processes in the cell (carbohydrate, protein, lipid, and nucleic), the enzymatic function, and the toxic function, as well as the mechanisms that determine pathogenicity and virulence and the antigen formation of the bacterial cell. Significant in the area of immunobiotechnology are the functions of antitoxin formation and the formation of different humoral factors of immunity, cellular factors, and regulatory mechanisms of immunity.

2. In place of traditional methods of deriving microbiological or immunological products, today's biotechnology uses the newest techniques and methods. For example, whereas traditional methods of deriving proteins, enzymes, amino acids, and other products were based on the cultivation and refinement of natural strains of microorganisms, now genetically engineered hyper-producing lines are used. Genetic engineering has also opened the door to making products that earlier either could not be produced on an industrial scale or whose derivation was severely limited for a number of reasons. An example is the interferon somatotropic hormone (STH), as well as several antigens and immune mediators. At one time, interferon was obtained from the leukocytes of donor blood, with the process requiring about one liter of human blood to make one dose of ultrapure, concentrated (injectable) interferon. Genetically engineered interferon alpha-2 (realphaferon), derived in our country by a group of scientists of the Academy of Sciences of the USSR, the Main Directorate of the Microbiological Industry, and the Ministry of Health of the USSR, under the direction of Academician Yu. A. Ovchinnikov, has turned out to be substantially more active, more economic, and more accessible to mass production [4,7]. One liter of a bacterial culture of a

line that produces *Pseudomonas* sp. with a built-in gene of interferon alpha-2 can produce 50-100 doses of pure, concentrated interferon for injection (with an activity of 10^6 lu), i.e., the problem of large-scale production of pure interferon can be said to be solved.

STH, which was once isolated from the human hypophysis (for one course of treatment, no fewer than 10 hypophyses were required), can now be obtained in quantities sufficient for the needs of the country by growing *Escherichia coli* with the built-in STH gene with a genetic engineering technique developed by the Academy of Sciences of the USSR and the NPO "Ferment" (Vilnyus). In the same manner, a line of producers that bear the gene of the target products can be used at facilities of the microbiological industry to obtain insulin, interleukins, human albumins, biologically active peptides (enkephalin, endorphin, tuftsin, etc.), and many antigens that are in short supply for derivation by the traditional method (hepatitis A and B, herpes, foot and mouth disease, influenza, etc.). Finally, in place of the age-old method of obtaining antisera and antibodies from the blood of hyperimmunized animals, primarily horses, donkeys, and rabbits, a method of obtaining hybridomas that produce monoclonal antibodies has arrived and has already established itself in immunology.

In a word, the new biotechnology is based on the contemporary achievements of genetics, genetic engineering, microbiology, and immunology.

3. Along with the wide applications biotechnology has for microorganisms (bacteria, viruses, and fungi), an industry that involves the derivation of human, animal, and plant cells (lymphocytes, hormonal cells, specific cells, and cells that produce biologically active and medicinal preparations) is growing and has a grand future. The production of ginseng cells used for preparing medicinal, cosmetic, and other products that contain the adaptogen stimulant has already reached the industrial level. We are sure that in the near future many medicinal substances will be obtained from plant cell cultures, and endogenous preparations from human cell cultures.

4. On a par with high-tonnage products (feed protein, yeast, enzymes for the food and light industries, vitamins, antibiotics, vaccines, plant protection agents, and amino acids), which are manufactured by the microbiological industry in large quantities (for example, in our country, feed-protein production alone reaches 1.5 million tons annually), a group of so-called low-tonnage products of microbiological synthesis has evolved and is ever expanding in variety. This group includes, for example, enzymes which

Basic Processes in the Cell and the Body That are Used in Biotechnology, and the Practical Achievements Recorded in the Implementation of These Processes

| Process Used | Biotechnology Product and Target Use | Efficient Derivation Method | Current Level and Earliest Possibilities |
|--|---|--|--|
| I. Metabolic Processes: Carbohydrate Protein Fat Nucleic and Others | Proteins, amino acids, lipids, vitamins, alcohols, organic acids, aldehydes, and others for use in agriculture and industry | Industrial-scale growth of bacteria, producers, or genetically engineered super- producers of target product | Industrial-scale derivation and wide- ranging application in national economy. Genetically engineered super- producers of some amino acids have been derived |
| II. Enzymatic Function | Enzymes (proteases, lipases, hydrolases, ligases, restrictases, and others) for use in the food and light industries, animal husbandry, medicine; for research purposes (genetic engineering) | Cultivation of most productive natural lines: use of culture of microorganisms or impure or pure isolated enzymes. Derivation and application of genetically engineered super- producers is possible | Extensive, large- scale use in food and light industries, agriculture, medicine, and veterinary science. More than 100 pure bacterial enzymes with nucleic acid metabolism (ligase, restrictase) are used in genetic engineering |
| III. Toxic Function | Microorganisms (bacteria, viruses, fungi) or their toxins for eliminating tree, soil, or crop pests (plant protection agents); for controlling disease | Selection of toxigenic micro- organisms, industrial cultivation, conversion of toxins into | Anatoxins (pure, sorbed) against diphtheria, tetanus have been used for more than 50 years, which has led to the elimination of rampant |

| Process Used | Biotechnology Product and Target Use | Efficient Derivation Method | Current Level and Earliest Possibilities |
|--|---|---|---|
| | carriers. Obtaining toxins for preparing vaccines (anatoxins) | anatoxins (diphtheric, tetanus, botulinal, choleric) or use of culture of micro- organisms as preparations for plant protection (e.g., B. thuringiensis) | disease. Industrial manufacture is in a wide assortment and in large quantities of SZR (dendrobacillin, bitoxybacillin, gomelin, and others) |
| IV. Mechanisms and Factors of Pathogenicity and Virulence, Antigen Formation | Isolating and obtaining protective antigens and formulating on their basis synthetic molecular vaccines; creation of live vaccines with full-fledged selection of protective antigens. Developing preventive and medicinal preparations of pathogenetic action. Creating allergens | Isolation of antigens from bacterial cell or viruses. Genetically engineered derivation of antigens. Chemical synthesis of antigens. Isolation of bacterial allergens | Molecular (chemical) vaccines are widely used in practical work. Protective antigens have been genetically engineered and are being studied (influenza, herpes, hepatitis A and B, foot and mouth disease, etc.) Only some determinants of antigens (lysozyme, etc.) have been chemically synthesized. Allergens are widely used for diagnosis and treatment of allergic disorders. |
| V. Antibody Formation and Other Factors of Humoral Immunity | Obtaining specific preventive and therapeutic antisera and | Hyperimmunization of animals or man and isolation of | Obtaining hyperimmune sera and immunoglobulins from |

| Process Used | Biotechnology Product and Target Use | Efficient Derivation Method | Current Level and Earliest Possibilities |
|--|---|--|---|
| VI. Cellular Factors and Processes of Immunity | immunoglobulins, interferons, and other factors of nonspecific immunity | antibodies from blood serum. Obtaining monoclonal antibodies from hybridomas | animals and humans and wide application with preventive and therapeutic aims in practice |
| | | Creation of genetically engineered lines producing protective factors | Wide use of monoclonal antibodies for diagnostics and in research. Creation of genetically engineered interferons alpha-2, gamma, and beta |
| | Cultures of lymphocytes of targeted action for transplantation in immune deficiency | Artificial growth outside the body; transplantation from another body | Cultures of lymphocytes have not found practical application. Transplanting of bone marrow cells has not been done on a wide scale |
| | Creation of cell receptors for strengthening cooperative interactions Strengthening the functioning of macrophages and lymphocytes | Obtaining receptors of antigen-sensitive or antibody- producing cells and, after study of their structure, producing them with genetic engineering outside the body | The possibility of deriving receptors and using them in preventive or therapeutic roles is being studied |

| Process Used | Biotechnology Product and Target Use | Efficient Derivation Method | Current Level and Earliest Possibilities |
|---|--|--|--|
| | | Developing nonspecific preparation/stimuli of cellular immunity (e.g., mitogens, adaptogens, and others) or preparations acting on cells (Cellon) | Nonspecific and specific stimuli of cell division and activation of cells (Cellon, tuftsin-type peptides, bacterial glycoproteins, e.g., muramyl dipeptide, etc.) have been derived; they are being studied and will find practical application very soon. It is possible that some of them may be genetically engineered. |
| VII. Regulatory Mechanisms of Immunity | Mediators and hormones, interleukin-1 and -2, T- and B-Activins, prostaglandins, neuropeptides for cooperative interaction between cells and for regulating the functions of cells and immune systems | The most promising and, perhaps, only means of mass production for practical use for many mediators is genetic engineering. Isolation from organs and tissue is possible, as well as chemical synthesis of peptides | Interleukin-1 and -2 have been genetically engineered and are being studied in the clinic; T- and B-activins have been obtained from tissue and are undergoing testing; hormones are obtained from organs and tissue; the possibility of genetic engineering (growth hormone) and chemical synthesis of biologically active peptides (endorphins, myelopeptides, etc.) is being investigated |

metabolize aminoacids essential for gene-engineering work (no fewer than 100); diagnostic preparations based on antigens and antibodies; and mediators and biologically active peptides that are used for research purposes and many of which serve as biochemical reagents. Therefore, as in the production of reagents in small-scale chemistry, it is advisable to separate the microbiological synthesis of low-tonnage products into the subfield of microbiotechnology, since periodic production of small volumes of products of a wide variety requires a different approach both to the creation of production facilities and to the organization of the technology and marketing of such products.

We have touched upon only a few of the achievements and the problems of biotechnology, as well as on a few of the prospects of its development in terms of microbiology and immunology. We did not examine here the extremely important technical and technological aspects of the production of biotechnology products. Of course, accomplishing the immense tasks that face biotechnology is impossible without scientific and technical progress in the growth of microorganisms and cells as well as the processes associated with their refinement for extracting the target product. Therefore, the development of new, progressive technological processes, the creation of up-to-date equipment, the development of mechanized and automated industrial-level production lines are among the most pressing tasks facing biotechnology. Presenting just such an acute problem, especially for the production of high-tonnage products, are raw materials, primarily for the manufacture of nutritive media, which must be cheap, abundant, and of high quality. However, all these problems require special examination.

Thus, biotechnology in the field of medical microbiology and immunology is the science, the applied branch, that defines the final stages of the research process and the transformation of scientific achievement into the practical. Therefore, in developing the fundamental areas of microbiology and immunology, obtaining the latest scientific data, and establishing new patterns and processes, we are thereby laying the scientific foundations of biotechnology, we are handing biotechnology new ways of solving practical problems associated with the development of preparations and agents for the prevention, diagnosis, and treatment of infectious and noninfectious diseases.

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13227

CSO: 1840/616

CONSOLE FOR GAS ANALYSIS

Riga NAUKA I TEKHNIKA in Russian No 12, Dec 86 p 4

[Article by V. Masin]

[Text] Lysine biosynthesis, yeast production, the processing of agricultural by-products (primarily straw into feed), and many other types of production in the microbiological, chemical, and food industries, as well as a variety of scientific studies, call for careful observation of culturing processes of anaerobic microorganisms and regulated measurements of the rate of oxygen consumption and carbon dioxide emission. Labor intensive methods based on analyzing the escaping gas are most commonly used in real-life conditions.

Scientists at the Bioengineering and Biophysics Laboratory of the Institute of Microbiology imeni A. Kirkhenshteyn of the Latvian SSR Academy of Sciences were assigned the goal of fully automating a determination of the rate of gas exchange. A PGA-2 Gas Analysis Console has been developed for this purpose. Using industrially manufactured analyzers, they designed new blocks which make it possible to obtain a large amount of additional information at a console, information which is then processed by a computer interface; the PGA-2 measures air flow per unit time, and the results of the readings are displayed on the instrument's forward panel in analog digital form. The computer then selects the optimal range for measuring the oxygen concentration of the gas mixture.

The console is small in size and runs on ordinary domestic current. In the experience of the Tripolskiy Biochemical Plant (Ukrainian SSR), the use of the PGA-2 yielded the enterprise an additional 390,000 rubles per year. Scientists from Moscow, Estonia, and the Ukraine, as well as scientists from our republic's laboratories have highly rated the development of PGA's in actual practice. It is no wonder that those who developed this equipment have been awarded two silver and two bronze medals at the USSR VDNKh [Exhibit of Economic Achievements].

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12976/9835

CSO: 1840/381

CREATING AND INCORPORATING NEW TECHNOLOGY AT LEVEL OF CURRENT REQUIREMENTS

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKNOLOGIYA in Russian Vol 31, No 6, Jun 86

[Excerpt from article under the "27th CPSU Congress Decisions--Into Practice," rubric: "Creating and Incorporating New Technology at Level of Current Requirements," Moscow, 1986]

[Excerpt] A number of branches of the economy are already using new, progressive forms to organize scientific research and incorporate new technology. They do so by organizing mobile, integrated brigades, which are set up by NII's [scientific research institute] and interested enterprises, and headed by chief specialists. Such brigades receive temporary unit status, and their personnel and work assignments are determined by specific problems which are corrected promptly as conditions warrant. "Incorporation brigades" may ensure their first consideration--motivated cooperation between workers at NII's and plants. Although work stoppages and even conflict situations can occur in such collaboration, the experiment has nevertheless yielded positive results in a number of fields. It would be well to study and generalize the experience available for its application to the system of NII's and enterprises in the medical and microbiology industry.

Studying the experience of socialist countries can yield a great deal. An organizational concept of cost-effective, temporary, scientific-incorporation collectives has proved its worth at the Farmakhim TPO in the People's Republic of Bulgaria.

It would be well to seek out the roots of many of the shortcomings in NII activity not only at low organizational levels, but also in insufficient ministry attention to science in the branches of the economy. This inattention has already manifested itself in the fact that institutes are not adequately equipped with experimental facilities, trial units for experimentation and modern instruments and equipment.

Serious problems are arising at the interface between science and production. Developments proposed by scientists are not brought up to the necessary stage

of completion. The time has come to draw up an interaction procedure for NII's, enterprises and production associations, and functional administrations of the Ministry, having determined the responsibilities and rights of each of the organizations listed, and their role in the practical solution of the issues of creating new technology, making it operational, and incorporating it.

Those who develop new technology and the personnel at enterprises are not similarly motivated to incorporate innovations. It is very important for those who develop new technology to attain the greatest economic impact with the new technology since transfers to the economic stimulation fund, a primary incentive source, are functions of this impact. This is by no means the primary source of incentive for enterprises since bonuses for new technology make up only a small part of the incentive to fulfill basic indicators of activity. Occasionally, enterprises and departments must answer for the number of measures on new technology and total capital expenditures, rather than for the effectiveness of planned and already incorporated measures. What kind of yield is there from these expenditures; how is the new technology being used; how does the quality of product output affect labor productivity? Do enterprises always take this extremely important factor into account when they adopt socialist obligations or counter plans?

The responsibility of industrial enterprises for modern and full utilization of new technology is not yet legally mandated. Enterprise and ministry managers must bear personal responsibility for the fate of new engineering and technology since incorporating the achievements of scientific and technical progress is not just an economic issue, but a social and political one as well.

The supply authorization system in operation at the present time does not resolve many of the problems in the organization of the incorporation process. Acceleration in the case of shortening deadlines and stepping up the scale of the incorporation of new technology cannot be expected without both the existence of specific plans for organizing the incorporation process, and the coordination of these plans with those adopted earlier or at any given moment for production, capital construction, material and financial supply, cadre training, etc. The incorporation of the most advanced technology, which yields the highest social and economic impact, must be made the core of the technical re-tooling of production. The medical and microbiology industry will work under experimental conditions in the current five-year period to expand the rights of production associations (enterprises), and to enhance their responsibility for work results. Central administrative organs are obligated to bear the major responsibility for the quality of plans, and to strictly control the progress of fulfillment. In the new conditions, the ministry must concentrate its attention on drafting plans for the future and the wide-scale use of innovations for raising the technical level of production and output.

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CSO: 1840/333

CZECH-SOVIET JOINT LABORATORY FOR BIOTECHNOLOGY AND LIVESTOCK BREEDING

Moscow TRUD in Russian 6 May 87 p 3

[Article by N. Shevtsov, Special Correspondent, Truda]

[Abstract] In the continuing restructuring of the economies of the socialist countries, great attention will be given to direct contacts between enterprises and organizations, with comprehensive development of direct production relationships, creation of international organizations and joint enterprises. Work has now started on a joint laboratory of biotechnology in animal husbandry in the Czech city of Nitra. The most important practice at the enterprise is transplantation of embryos in agricultural animals. A highly productive cow is impregnated, the embryo is extracted and transplanted to a less productive animal. The calf will be just as productive as the donor cow. The operation can be repeated, yielding 6-12 highly productive calves per year. By freezing embryos and maintaining them in liquid nitrogen, they can be transplanted to recipients at long distances, in different countries. However, workers at the joint laboratory are concerned that there are as yet no regulations governing transfer of the results of research performed here directly to the economy. The laboratory is a good illustration of the importance of joint efforts among socialist nations.

6508/9835

CSO: 1840/803

ALGOBACTERIAL COMPLEXES IN SOIL BLOOMING

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 17, POCHVOVEDENIYE
in Russian No 3, Jul-Sep 86 (manuscript received 28 Feb 85) pp 38-43

[Article by L. I. Domracheva, O. A. Lebedeva and P. A. Kozhevin]

[Abstract] Dry smear examinations were conducted on dernovo-weakly podzolic soil, showing blooming, to ascertain the bacterial-algal relationship. Ten-gram soil samples were analyzed at depths of 0-2, 2-5, 5-10 and 10-20 mm, a technique representing a novel approach to microbial quantification of soil samples. Tabular and graphica representations of the results demonstrated pronounced stratification of bacterial and algal populations, with the algal population ca. two-orders of magnitude greater than the bacterial counts at a given stratum. These observations demonstrated that, in the case of soil blooming, the algal population could be regarded as fulfilling a nutrient role for the bacterial flora. Figures 1; references 13: 12 Russian, 1 Western.

12172/9835
CSO: 1840/1070

UDC 616.99+616.9361-022.375-053.2:364.446:371] "Artek"

IMPORT OF PARASITIC DISEASES INTO ARTEK PIONEER CAMP

Moscow MEDITZINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 3, May-Jun 86 signed to press 17 July 85 p 86

[Article by L. A. Yushko, Yalta City Sanitary and Epidemiological Station of Crimea Oblast: "On the Import of Parasitic Diseases into Artek Pioneer Camp"]

[Text] In the course of a year 22,000 children rest at Artek Pioneer Camp, and during one summer shift--4,500, including up to 1,000 foreigners. A great deal of work is being done here to identify tropical parasitic diseases and especially malaria. Since most of the vacationers arrive during the season when local conditions make the transmission of malaria possible, special attention is given to the timely identification of the disease.

Every year medical workers from different republics come to take care of Artek vacationers during the summer season. Unfortunately, these workers are inadequately trained to identify tropical parasitic diseases. For this reason, we give them special training in seminars and conferences on urgent problems in medical parasitology. This is done systematically for Artek Camp's medical workers.

All 10 brigades in Artek Camp have special facilities for drawing blood. Nurses are trained in the methodology for preparing thick smears of blood for diagnosing malaria. Parasitological analyses are performed by trained cadres in the Artek laboratory. Treatment is provided in the hospital of the pioneer camp. The implementation of the necessary measures will considerably improve the ability to diagnose malaria already during the first days of the disease. Thus, for example, during the last 8 years 112 imported cases of malaria have been discovered at Artek Camp; of these, there were clinical manifestations in 82 children and 39 individuals were found to be carriers of the parasite. In a significant portion of the vacationers malaria was discovered in children under the age of 14. The formulation of the malaria diagnosis was difficult due to the absence of typical symptoms. The sick complained of severe headaches, sometimes nausea and vomiting, and dizziness. In some children in connection with catarrhal symptoms and high temperatures the initial diagnosis of "rhinopharyngitis" or "ORZ" [diseases of the ear and nose] turned out to be incorrect. The drawing of blood sample for a thick smear and meticulous microscopy have helped to diagnose malaria in a timely manner.

Filariasis was discovered in 17 individuals according to clinical and epidemiological readings; schistosomiasis--in four persons, and in three of these--genitourinary schistosomiasis. Ankylostomiasis [hookworm] was discovered in five children weakened by anemia; they were given anthelmintic therapy. Treatment of all other diseases caused by worms was not carried out because of the short stay of the children in the camp. However, the correct diagnosis was established for them and recommendations regarding treatment were provided.

The timely formulation of the diagnosis of tropical helminthiasis helped to avoid the pointless examination of the children by a surgeon. All of the work was performed by the medical section of Artek Camp jointly with the Yalta Sanitary and Epidemiological Station. Special attention was given to the systematic struggle against vectors and to hydro-technical measures. Control over the sterilization of medical instruments was strengthened. In August 1985 Artek Camp celebrated its 60th anniversary. To the achievements of the camp's medical section we should add successful work on the timely diagnosis of parasitic diseases, which has contributed to the maintenance of stable epidemiological well-being with regard to malaria in the spa city of Yalta.

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CSO: 1840/598

UDC 616.61-008.64-036.12-045.473:616.61-78]-06:616.36-002.578.891]-078.73

DETECTION RATE OF VIRUS HEPATITIS B MARKERS IN PATIENTS IN HEMODIALYSIS
DEPARTMENT

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian
No 9, Sep 86 (manuscript received 8 Jan 86) pp 42-44

[Article by V. I. Vasilyeva, A. A. Asratyan, M. Yu. Ivanova, V. A. Overchenko,
E. V. Andreytseva and L. F. Yeseyeva, Scientific Research Institute of
Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical
Sciences; Municipal Clinical Hospital No 50, Moscow]

[Abstract] Monthly serological and biochemical studies of blood serum of 22 patients (9 women and 13 men ranging in age from 18-49 years) with chronic renal insufficiency and studies of blood of 200 donors in the same age range showed a high percentage (72.6 percent) of hepatitis B markers in the patients' blood as compared to 21.0±2.9 percent in blood of the control group. This confirmed the high risk of hepatitis B infection in the group of patients. Biochemical studies to detect markers of hepatitis B included counter-current immunoelectrophoresis, the passive hemagglutination test and solid-phase radioimmunoassay tests. The use of highly sensitive methods of detective HbsAg during blood donor selection proved to be very important in reducing the risk of infection of chronic renal insufficiency patients by hepatitis B virus. Regular laboratory and clinical examination of patients facilitates early detection of persons with asymptomatic forms of hepatitis B and hepatitis carriers among patients in the chronic hemodialysis department. Figure 1; references 10: 2 Russian, 8 Western.

2791/9835

CSO: 1840/620

ANALYSIS OF SPECIFICITY OF SEROLOGICAL DIAGNOSIS OF ACQUIRED IMMUNODEFICIENCY SYNDROME

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9, Sep 86 (manuscript received 6 Dec 85) pp 73-76

[Article by A. F. Etkin, V. V. Pokrovskiy and Z. K. Yankina, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow]

[Abstract] Assessment of the specificity of Virognostika diagnosticum (produced by Organum, the Netherlands) in AIDS diagnosis, detection of false positive reactions and methods of eliminating them were discussed. Specificity of interaction of Virognostika with blood serum was determined in studies of school children and in patients with diseases posing different levels of risk of infection by the AIDS virus. Positive reactions occurred in 6.1 percent of sera from persons with blood diseases, in 9.2 percent of sera from hepatitis B patients and in 5.7 percent of sera from persons with oncological diseases. False positive tests were attributed to autoantibodies interacting with components of the producer-cell membrane, contaminating the antigenic preparation. Slightly positive reactions could be removed, in most cases, by adsorption by groups AB and O erythrocytes and by treatment with the lysate of human lymphocyte culture. The single remaining positive serum was from a healthy, bisexual African (an asymptomatic carrier). References 7; 4 Russian, 3 Western.

2791/9835

CSO: 1840/620

UDC 616.98:578.833.25](5-925.8.9]

DENGUE HEMORRHAGIC FEVER SYNDROME IN DEVELOPING SOUTHEAST ASIA

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9, Sep 86 (manuscript received 2 Oct 85) pp 99-102

[Article by V. I. Pokrovskiy, Nguen Tang AM and B. A. Godovanny, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health; Vietnam Ministry of Health]

[Abstract] Incidence of dengue hemorrhagic fever syndrome and accompanying shock syndrome from 1956-1976 in the Philippines, Thailand, Malaysia, Indonesia, Burma and Singapore was shown in a table and discussed in the article. The epidemiology and clinical course of the disease was discussed. Climatic and geographic factors affecting Aedes aegypti mosquitos were discussed in relation to spread of the disease. Contradictions concerning pathogenesis of the disease were discussed. Prevention of the disease centers around

A. aegypti control including use of very small amounts of malathione which, in proper doses, destroys adult mosquitos and larvae. Mechanical larvae control includes water purification to destroy eggs and the use of tropical fish (Poeciliidae, Goodeidae and others) which poison the larvae. The importance of sanitary education work was emphasized with discussion of some measures being taken. Immunization measures are discussed. Attempts to develop a live attenuated vaccine have been underway in the USA and Southeast Asia since 1971. Figure 1, references 14: 5 Russian, 9 Western.

2791/9835
CSO: 1840/620

UDC 616.98:579.852.11]-06:[616.98:579.852.13

CASE OF TETANUS IN COMBINATION WITH GAS GANGRENE

Moscow ANESTEZIOLOGIYA I REANIMATOLOGIYA in Russian No 5, Sep-Oct 86
pp 69-70

[Article by G. K. Ivanov, Republic Hospital No 1, Chuvash ASSR Ministry of Health, Cheboksary]

[Abstract] The case is presented of a 58 year old woman hospitalized on 9 Nov 84 with tetanus. Conventional supportive therapy in combination with specific antiserum resulted in clinical improvement, when complications ensued in the form of gas gangrene on 20 Nov 84. Between 29 Nov 84 and 3 Dec 84 the patient underwent 10 hyperbaric oxygenation treatments in conjunction with other antibiotic and immune therapies. The patient was eventually discharged following full recovery from both disease entities. This appears to have been an uncommon case of combined infection with two anaerobes.

12172/9835
CSO: 1840/1110

UDC 616.98:579.881.13]-06:616.8

NERVOUS SYSTEM INVOLVEMENT IN Q FEVER

Moscow KLINICHESKAYA MEDITSINA in Russian No 9, Sep 86 (manuscript received 16 Dec 85) pp 122-123

[Article by V. V. Arkhipov and T. V. Arkhipova, Alma-Ata]

[Abstract] A case study is presented of a 30 year old male patient admitted on the 4th day after onset of illness with headache, fever, respiratory difficulties, facial pain, and hypotension. At the time of admission the

patient was unconscious, and succumbed 6 days later (11 days after onset). Autopsy findings, immunofluorescent staining, and intra-vitam serologies pointed to Q fever and brain stem encephalopathy as the cause of death. This case represented one of the rarer complications of Q fever, encephalopathy, which in this case was the direct cause of death.

12172/9835

CSO: 1840/1087

UDC 539.16.04:636.084.085

INCREASING NUTRIENT VALUE OF BARLEY BY TREATING IT WITH ACCELERATED ELECTRONS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 3, Mar 87
(manuscript received 14 Jan 87) pp 93-95

[Article by T. V. Chemm and Ya. Ya. Latviyetis, Latvian Order of Labor Red
Banner Agricultural Academy]

[Abstract] Recent reports have indicated that treatment of wood fiber, straw and other products with accelerated electrons increases the percentage of assimilation of the products by animals. In the present studies, barley was treated with accelerated electrons in doses of 0.1-0.5, 1.0 and 5.0 Mrad and fed to piglets until they were 136 days old. Piglets in the group receiving barley treated with accelerated electrons grew more rapidly than in the control group, the gain being greater, the higher the dose of electrons. The percentage of digestion of the irradiated feed was higher. References 5: 1 Russian, 4 Western.

6508/9835

CSO: 1840/875

UDC 616-001.+617.3]-085.849.19

LASER THERAPY IN TRAUMATOLOGY AND ORTHOPEDICS

Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian Vol 87, No 3, May-Jun 86
(manuscript received 10 Nov 84) pp 182-184

[Article by U. Ya. Bogdanovich, Kazan Scientific Research Institute of
Traumatology and Orthopedics]

[Abstract] Extensive clinical experience with the use of a helium-neon laser in management of a variety of injuries and orthopedic problems is reviewed. In general, this form of laser therapy has been found most effective in the treatment of wounds and trophic ulcers, in which complete healing is obtained in 42-74% of the cases. Other cases that have been successful managed with the laser therapy were stage II-III deforming arthroses, shoulder periarthrosis, and calcaneal spurs. In addition, laser puncture was also found effective in correcting large joint contractures. References: 16 Russian.

12172/9835
CSO: 1840/1092

UDC 618.177-085.849.19

LASER THERAPY IN TUBAL INFERTILITY

Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian Vol 87, No 3, May-Jun 86
(manuscript received 20 Jan 86) pp 184-186

[Article by R. A. Rodkina, V. N. Baranov and G. I. Shabunina, Chair of
Obstetrics and Gynecology, Kuybyshev Medical Institute imeni D. I. Yulyanov;
Family and Marriage Center of No 3 Childbirth Home, Tyumen]

[Abstract] Helium-neon laser (LG-75-1 instrument, 632.8 nm, 20 mW output) therapy was employed in 72 female patients, 21-38 years old, with tubal infertility. Within a year of treatment, 14 of the women became pregnant. The therapy consisted of irradiation of several selected fields, 1 min/field, for a total of 3-7 min per treatment, with a total of 8-12 daily treatment

sessions beginning on the 6-9th day of the menstrual cycle. The course of treatment was repeated in 4-5 months, and again in 6 months if needed. One to two months after a course of laser therapy tubal lavage was performed. This therapeutic regimen was found effective in controlling inflammatory changes and alleviating pain, as well as in normalizing the pH of the cervical mucus. An added advantage of this approach was the elimination of drug use. References: 5 Russian.

12172/9835
CSO: 1840/1092

UDC 615.849.19.03:616.1/.4

LASERS IN THERAPEUTIC CLINICS

Moscow KLINICHESKAYA MEDITSINA in Russian No 6, Jun 86
(manuscript received 16 Oct 85) pp 9-14

[Article by A. M. Nogaller and V. S. Zvonkov, Chair of Introductory Internal Diseases, Ryazan Medical Institute imeni I. P. Pavlov]

[Abstract] A review of current practices in the use of laser in therapeutic clinics has shown that in most cases reliance is placed on helium-neon lasers with a functional wavelength of 0.6328 mcm. Basically, lasers are employed to secure three types of effects, the first of which is tissue coagulation. This modality has found wide application in dermatology and oncology for controlling blood loss. In surgery much more powerful lasers are used to secure tissue dehydration and evaporation. Finally, low-energy emissions are used to induce biochemical and physiological changes. The latter type of radiation is used in treating individual organs of biologically-active cutaneous points. Although some controversy exists regarding the full scope of laser application in therapeutics, the need for further investigation and confirmation of current practices is mandatory and promises to expand the role of lasers in medicine even further. References 52: 46 Russian, 6 Western.

12172/9835
CSO: 1840/1096

ADVANTAGES OF LASER SURGERY IN GASTROINTESTINAL OPERATIONS

Leningrad VESTNIK KHIRURGII in Russian No 7, Jul 86
(manuscript received 6 Dec 85) pp 15-20

[Article by O. K. Skobelkin and Ye. I. Brekhov, professors, and
V. P. Bashilov, M. V. Smolyaninov and V. I. Yeliseyenko, doctors of medical
sciences, All-Union Scientific Center of Laser Surgery, USSR Ministry of
Health]

[Abstract] The remarks by Nechay et al. [Vestnik Khirurgii, No 1, pp 37-41, 1985], questioning the value of laser surgery in gastrointestinal operations is based on a number of technical errors perpetuated by the authors. The USSR remains the leader in laser surgery, with studies at the All-Union Center for Laser Surgery having delineated the criteria governing successful use of lasers in gastrointestinal surgery. The primary factor constituting a prerequisite for successful surgery rests on the use of powerful lasers (100-300 W) and compression of the tissue to be resected. In such situations, sectioning predominated and other laser effects are minimized. Failure to use a high-power laser predisposes to coagulation and necrotic sequelae and, invariably, leads to failure. References 8: 5 Russian, 3 Western.

12172/9835
CSO: 1850/1088

RESEARCH ON MAN-DOLPHIN INTERACTION

Moscow STROITELNAYA GAZETA in Russian 20 Mar 87 p 4

[Article by Ye. Popok under the "Reporting" rubric: "Home for Dolphins"; first paragraph, STROITELNAYA GAZETA introduction]

[Text] The dolphinarium at the Georgia department of the All-Union Marine Fishing Industry and Oceanography Scientific Research Institute [VNIRO] has become one of the main sights of Batumi.

A unique facility made of precast reinforced concrete and decorated with mosaic tiles was erected 12 years ago based on the design of local architects. Thirty afalina [transliteration dolphin] (the name of one of the largest types of dolphins) now inhabit it. Each is up to 3 m long and weighs up to 350 kg.

The dolphins are receptive to instruction, and they possess a good memory and a vividly expressed capability of imitation. All of these factors have determined the success of their rapid training.

"Dolphins' amazing capabilities are well known," says Kemal Abdulovich Dzhincharadze, head of the mammals department of the Georgia department of the VNIRO. "These remarkable inhabitants of the sea with their peaceful disposition have many instincts to become a friend of humans and their helper in studying the seas' depths. We are working in this direction. We are studying dolphins' behavior in captivity and their perceptual capability, and we are working out ways for humans to communicate with them. And of course we are dreaming of the time when they will become reliable helpers of humans in the open sea and "shepherds" of flocks of fish that will locate schools of fish, supply signals to fishermen, and hold schools of fish until ships arrive. But all of this remains for the future.

Cinematographers often visit the Batumi dolphinarium. It was here that the studio Kiev Scientific Films [Kiyevnauchfilm], for example, shot the episodes of the first Soviet three-series color artistic film entitled "People and Dolphins." On the film set I met with Milena Tontegoda, the young actress from a Leningrad studio. Possessing enviable self-control, she fearlessly lowered herself into the basin, swam with her arms around the dolphins, stroked them on the back, and clung to a flipper. If the TV viewer will

recall, in the same film she played the role of a physician who agreed to take part in a scientific experiment--to live alone with a dolphin for an extended period in isolation from the outside world.

12794

CSO: 1840/660

BRIEFS

US NAVY TRAINS DOLPHINS -- Every year the US Navy spends millions of dollars teaching and training dolphins, seals, and whales, reports the Associated Press. Many of these research programs are top secret. They include, in particular, programs to study the visual and auditory systems of these animals, their navigational skills, and also a training program in which the sea mammals learn to fetch objects from great depths and even function as an underwater defense. According to representatives of the Navy, who have asked that their names not be given, last year a special experiment was performed in one of the bays off South Carolina in which dolphins were used to detect mines. According to B. Pritchard, a representative of the Pentagon, the Navy never made a secret of the fact that sea mammals were being used for military research. The Navy continued to train sea mammals during the war in Viet Nam. At that time US specialists experimented in the use of dolphins to detect frogmen in Cam Ranh Bay. [Moscow, ARGUMENTY I FAKTY in Russian No 46-47, 1986 p 15] 9285

CENTRIFUGE FOR PLASMAPHORESIS

Moscow SOVETSKAYA ROSSIYA in Russian 4 Feb 87 p 4

[Interview of A. Naumenko, chief of the RSFSR Ministry of Health Department of Blood Transfusion, by N. Dombkovskiy, Moscow: "The Centrifuge in Physicians' Arsenal: A Network of Unique Centers for Treating Blood Is Being Set Up"]

[Text] The RSFSR Ministry of Health has decided to create, in major cities, the first medical centers in the country for gravitational surgery on blood. A. Naumenko, chief of the Department of Blood Transfusion of the RSFSR Ministry of Health, and candidate of medical sciences, discusses this.

"Blood is life. Since ancient times medical workers have been trying to grasp its secrets, learn to detect its diseases, and find methods of treating them. Modern science has long since taken its first steps along this path, and one of the latest achievements in practical hematology--the study of blood--has been what is known as plasmaphoresis. The essence of this method is as follows.

"Let me remind you that blood consists of three basic components--erythrocytes, or red blood cells, leukocytes, or white blood cells, and plasma. Disruption of their proportions by even a few percent will lead to serious illnesses. Up until recent times the main method of fighting these diseases was medicamental --that is, by medicines--by affecting the blood-producing organs.

"But then it turned out that by using relatively simple apparatus it was possible to divide blood into its component parts and, after replacing one of them completely, return the repaired blood to the body. By very rapid rotation, a special medical centrifuge creates an increased force of gravity in a container holding the blood of a patient. Because of the different specific weights of plasma, erythrocytes, and leukocytes, the blood separates into layers, and it remains only to draw away the afflicted component.

"Among the diseases which are amenable to this treatment are ones as dangerous as leukemia, purulent inflammation arising after surgical intervention, and peritonitis. Treatments developed in the Central Scientific

Research-Institute of Hematology and Blood Transfusion are distinguished by their inexpensiveness and very high effectiveness.

"And one other aspect of gravitational surgery must certainly be mentioned--the donor. Donors' blood plays a vast role in medicine today. Apart from the most direct use--that is, transfusion to patients--it is used to make many medicines for which there are no substitutes. These include albumin, gamma globulin, interferon, and others. Only plasma is used to prepare these, while the other components are wasted in traditional technology. But if the donor's blood is processed in a centrifuge as soon as it is taken out, then the erythrocytes and leukocytes can be returned to the donor. Blood plasma is regenerated by the body much more rapidly than red and white blood cells, therefore the donor can give blood again after only a few days. But under the traditional method, the regeneration requires months.

"The program for creating centers in the cities of the RSFSR is planned to take several months, but I am afraid that we will not keep within the established time periods. And here is why.

"The first problem is the medical centrifuges. They are produced in our country in enterprises of several ministries, and are distinguished for their high quality, but they are in catastrophically short supply. Moreover, this is not only for treatment establishments but also even for scientific ones. And the reason is not that the industry is not in a position to make as many as are required. The Ministry of Medical and Microbiological Industry, which intermediates between us, the customers, and the manufacturers, is simply demonstrating fundamental irresponsibility and ineffectiveness. The impression is created that for its workers the main thing is to distinguish themselves in terms of their gross output, and the rest has nothing to do with it.

"The second problem is the apparatus and equipment for storage and transfusion of blood. Unfortunately, we are still working, to a significant degree, with the traditional glass containers and multiple-use syringes. In order to use them a second time, they must be thoroughly disinfected, but this is a procedure which, no matter how thoroughly it is carried out, still does not guarantee 100-percent results.

"At the same time, the whole world has long since switched to single-use packaging. Apart from absolute sterility, it has many other advantages as well. In such containers, manufactured from special plastic, donors' blood can be stored for several months. A plastic container can be made in any form and size, which makes it unnecessary to pour blood from one container into another.

"Such packaging material is made in our country, but in completely unsatisfactory quantities. Kompoplast and gemmakon (these are the names of containers for hematology) are manufactured in a single plant only: the Sintez Plant in Kurgan. It was built 10 years ago, the equipment is already worn out, but its controlling ministry--that same Ministry of Medical and Microbiology Industry--is not doing anything to correct the situation. In

addition, we are warned every year that the production of the plastic will be steadily reduced.

"I think that there is nothing which can justify this position--all the more so in a question such as the preservation of health."

12255

CSO: 1840/15

NEEDLE-MOUNTED MICROENDOSCOPE

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 3, 3-16 Feb 87 p 3

[Article by V. Yashin, physician]

[Text] A unique microscope mounted in an aspirating needle was developed by specialists from the Neurology Department of the Moscow Oblast Scientific Research Institute imeni M.F. Vladimirskiy [MONIKI] in collaboration with engineers from the State Optical Institute imeni S.I. Vavilov.

The spinal fluid that is extracted with the help of an aspiration needle does not give a complete picture of the changes in a disease-damaged organ. And an x-ray isn't informative enough when the spinal cord is being dealt with. A modified type of endoscope--an instrument usually used to diagnose gastrointestinal diseases--has therefore been adapted for research in this region. Besides its new form, the instrument has also received a new purpose.

The instrument also helps in looking inside ("endo") the vertebral canal because it possesses optical and light devices. With artificial illumination, the color of the spinal fluid, the filling of membranes and vessels with blood, and above all, changes induced by pathology are all clearly visible. The diagnosis is always precise, and treatment may be begun quickly by injecting medicine into the vertebral canal through the very same needle.

In addition, by connecting a special extension piece to the eyepiece, it is possible to take photographs. Scientific material that has been generalized in atlases with slides and photographs will help physicians make a prompt diagnosis.

Unfortunately, the new endoscope's field of view is still limited to a band region of the spinal cord. The next goal of the MONIKI is to create a flexible endoscope for penetrating into any point in the spinal cord.

12794

CSO: 1840/660

UDC 616-001.17-06-616.94.022.7-579.841.11]-085.332-577.182.75],015.2:615.371:57
9.841.11]-036.8-07

DYNAMICS OF CONTAMINATION OF MICE IN TREATMENT OF BURN SEPSIS, CAUSED BY
PSEUDOMONAS AERUGINOSA, BY TOBRAMYCIN ALONE OR IN COMBINATION WITH ACTIVE
OR PASSIVE IMMUNIZATION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 9,
Sep 86 (manuscript received 6 Nov 85) pp 90-92

[Article by V. V. Minukhin and A. Ya. Tsyganenko, Kharkov Medical Institute]

[Abstract] A study of contamination of the internal organs, blood and wound surface of mice during treatment of (*Pseudomonas aeruginosa*-induced) burn-sepsis--by tobramycin alone and in combination with *P. aeruginosa* corpuscular polyvalent virus (PKSV) or *P. aeruginosa* hyperimmune plasma (GSP)--included 18-20g mice subjected to 3d degree burns on 10 percent of the body and burn sepsis induced by cutaneous infection by *P. aeruginosa*. Injection of an average therapeutic dose of tobramycin (2.5 mg/kg of body weight/day) alone or in combination with the immune preparations prevented death from burn sepsis in all of the mice. Contamination of the internal organs and the wound surface by *P. aeruginosa* was lower in mice receiving combined therapy than in mice given tobramycin alone but the blood of all mice was sterile from the 5th day of observation in all cases. Tobramycin and GSP was more bacteriologically effective in the early period of treatment. More pronounced evidence of immunization of infected mice by PKSV combined with an average therapeutic dose of tobramycin than by treatment with tobramycin alone became evident from the 10th day of study. Figure 1, references 10: 8 Russian, 2 Western.

2791/9835
CSO: 1840/620

NEW MATERIALS FOR EYE SURGERY

Moscow IZVESTIYA in Russian 2 May 87 p 3

[Article by A. Zinovyev, Special Correspondent, Izvestiya, Ufa]

[Abstract] Ernst Muldashev has studied the problem of rejection of surgical implants for years, and is continuing his studies at the Ufa Scientific Research Institute of Eye Diseases, attempting to force the body to construct tissues of foreign materials. Materials have been developed, techniques for their application designed, authors certificates granted. More than 10,000 operations have been performed using the methods and new plastic materials developed by E. Muldashev and his colleagues. The essence of the approach to restorative surgery is control of the rejection reaction, in that the rejected transplantate is not simply destroyed by the body, but rather used by it as a structural material for the growth of its own new tissues. The destructive reaction of rejection is thus converted to a creative reaction.

6508/9835

CSO: 1840/802

UDC 579.69.620.193.8

BACTERICIDAL PROPERTIES OF CORROSION INHIBITORS DIRECTED AGAINST SULFUR METABOLIZING BACTERIA

Kiev MICROBIOLOGICHESKIY ZHURNAL in Russian Vol 47, No 6, Nov-Dec 85
(manuscript received 26 Apr 84) pp 88-90

[Article by A. I. Pilyashenko-Novokhatnyy, N. S. Antonovskaya, I. A. Kozlova, A. K. Mindyuk, Ye. I. Andreyuk, Institute of Microbiology and Virology of the Ukrainian SSR Academy of Sciences, Kiev. First two paragraphs are source summary]

[Text] This is a study of the effects of the KKhO series of corrosion inhibitors on growth and enzymatic activity of sulfur cycle bacteria. It was shown that the KKhO inhibitors display a bactericidal action against thio-bacteria and sulfate-reducing bacteria.

The possibility is explored of using the KKhO inhibitors as supplementary protection against bio-degradation.

Microorganisms appear to play an important factor in the total process of corrosion of subsurface structures. The sulfur cycle bacteria are the core of the aggressive, microbiological communities in soil (1,2). The corrosive activity of these bacteria is determined by the composition of the oxidation-reduction enzymes, which can act upon the inert, protective film around a cathode surface, thereby accelerating corrosion of the metal. Apparently, need exists to gain new means of fighting corrosion. The remedy should come from an agent which has a high degree of bactericidal action against thio-bacteria and sulfate-reducing bacteria.

The KKhO inhibitor series, which we have studied, could effectively complement the existing list of protective methods. The KKhO inhibitors at a very low concentration suppress the growth and development of sulfur cycle bacteria.

MATERIALS AND METHODS. Materials used for the studies of the bactericidal activity of the KKhO series of inhibitors were a three-day-old culture of the thio-bacteria *Thiobacillus thio-parus* sub-species No 21 and No 5, along with the sulfate-reducing bacteria *Desulfovibrio* sub-species No 37, isolated from a soil where gas pipe lines were undergoing corrosion.

The thiobacteria were grown in Beijerinck media, and the sulfate-reducing bacteria, in Postgate media.

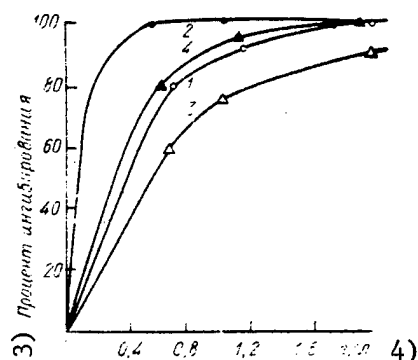
The concentration of inhibitors, added to the growth media of the thiobacteria, was in the range of 0.5 to 2.0 g/l. The efficacy of action of the inhibitors against the thiobacteria was measured by the amount of growth suppression of those bacteria. The number of thiobacteria cells that grew after treatment with the inhibitor, and, in a control, was determined by the optical density of the cell suspension, in a FEK-56 photocolormeter, with a green light-filter. The percent inhibition was calculated from the ratio of the optical density of the test suspension to that of the control.

The efficacy of the KKhO inhibitors with respect to sulfate-reducing bacteria was determined by the degree of reduction in activity of the hydrogenase enzyme. Change of hydrogenase activity under the influence of KKhO inhibitors, was determined spectrophotometrically, based on degree of reduction of nicotinamide-adenine-dinucleotide (NAD) by molecular hydrogen, under anaerobic conditions. The measurements were made at wavelength 340 nm, on a "Specord UV-VIS" (GDR, East German) spectrophotometer.

Study of the total effect of the inhibitors as anticorrosive agents and bactericides was conducted under laboratory conditions, against low-carbon-content steel (Steel-3), submerged in a culture of the acidophobic thiobacteria. The experimental flask contained inhibitors at a concentration of 0.6 g/l. Duration of the experiment was 430 days. The initial titer was 10^8 , pH 7.82, t° 25°C. The concentration of soluble forms of iron was determined by a previously described method (4).

RESULTS AND DISCUSSION. Our study of the effect of four, different KKhO inhibitors showed that all of them had a bactericidal action against the acidophobic, thiobacteria *T. thio-parus* No 21 (see the graph).

- 1) Зависимость степени угнетения роста *Thiobacillus thioparus*, шт. 21, от концентрации ингибиторов серии КХО: 1 — КХО, 2 — КХО-2, 3 — КХО-5, 4 — КХО-6.



1) The degree of growth suppression of *Thiobacillus thioparus* No 21 as a function of the concentration of the KKhO inhibitors.

2) 1 - KKhO, 2 - KKhO-2, 3 - KKhO-5, 4 - KKhO-6

3) Percent inhibition

4) Inhibitor concentration g/l.

As shown in the graph, the KKhO-2 inhibitor was the most effective bactericidal agent; it totally suppressed the thiobacteria growth at a concentration of 0.4 g/l. The KKhO and KKhO-6 were less active, and showed bactericidal action only in concentration of 1.2-1.3 g/l. The least active was the KKhO-5 inhibitor which required a concentration of 2.0 g/l to fully inhibit the thiobacteria growth.

According to Booth's assumption, the corrosive activity of sulfate-reducing bacteria is determined, to a great degree, by the enzyme hydrogenase which is responsible for isolation and fixation of molecular hydrogen. Therefore, the influence of the KKhO inhibitors on the hydrogenase reaction was precisely that indicator which was taken into account in the study of the inhibitors' action on the sulfate-reducing bacteria. All of the studied inhibitors in concentrations of 0.1 g/l totally suppressed the hydrogenase activity. The enzymatic activity was not restored by raising the concentration of hydrogen or of NAD, in the reaction vessel.

The anti-corrosive action of the KKhO inhibitors has been tested in media with thiobacteria which were at the stage of post-stationary growth, and in sterile Beijerinck media, used for their culture. At the end of the experiment, the rate of corrosion of metal plates in the media with thiobacteria metabolites and in sterile media, was 11.72 and 14.31 mg/dcm²/24 hrs, respectively. Metal plates, submerged in the media with the bacteria, but without the corrosion inhibitors, corroded significantly faster. The rate of corrosion was 22.15 mg/dcm²/24 hrs. These results are the average of three measurements.

In the media containing bacteria, but without corrosion inhibitors, the amount of iron oxide ions in the solution was 1.77 mg/ml. In the presence of the corrosion inhibitors, the content of trivalent iron ions was lowered by a factor of 2.7 (0.65 mg/ml).

Thus, the studied KKhO corrosion inhibitors which displayed a strong bactericidal action against the acidophobic, thio- and sulfate-reducing-bacteria, decreased the rate of corrosion of low-carbon steel by a factor of 1.5 to 2.0.

On the basis of current investigations, we conclude that the KKhO series of inhibitors can act as an effective supplement to the existing means of corrosion prevention.

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13131/9835

CSO: 1840/285

TREATMENT OF ISOLATED AND COMBINED WOUNDS OF MAJOR BLOOD VESSELS OF THE NECK

Kiev KLINICHESKAYA KHIRURGIYA in Russian No 10 Oct 86 p 67

[Article by V. K. Minachenko, of the Inter-Oblast Brigade for Specialized Aid to Patients with Acute Vascular Pathology (Chief, Professor Yu. V. Novikov), Department of Traumatology, Orthopedics and Military-Field Surgery (Chief, Professor V. V. Klyuchevskiy), Yaroslavl State Medical Institute]

[Text] This is a study of the treatment of 81 patients with isolated and combined wounds of the blood vessels of the neck. Thirty-three of the patients had suffered injuries to the carotid artery, 7 to the internal jugular vein, 3 to the vertebral artery, 27 to the subclavian artery, 8 to the subclavian vein and 3 to the venous angle of Pirogov. In most cases, circulation through the vessels was restored by suturing them (47 operations). A significant number of bindings were due to ligation of the external carotid artery (11 instances). In addition to wounds of the major blood vessels, 28 patients had injury of the trachea, larynx, pharynx, or esophagus. Fifteen patients (1.3%) had combined wounds of the blood vessels of the neck which extended into the thoracic cavity. All wounds were on the left side.

Thirteen patients displayed symptoms of respiratory deficiency. In the puncture and thoracotomy more than 1 liter of blood was obtained from 12 of them and from 1, 300 ml. The presence of such a large quantity of blood in the pleural cavity can be explained by communication between the cavity and the lumen of the blood vessel or by a throbbing hematoma. Prolonged hemorrhaging was promoted by hiatus of the wound in the blood vessel, leading to loss of the connection between its fascial sheath and the clavicle, as well as by negative pressure in the pleural cavity.

A marked pneumothorax was observed only in 1 patient with an extensive penetration wound of the chest. Evidently, introduction of air into the pleural cavity was prevented by a blood clot that obstructed the opening of the wound canal.

In the case of combined wounds of the blood vessels of the neck, penetrating into the pleural cavity and complicated by hemothorax, we consider it an error to begin an operation with a thoracotomy. In such situations a thoracocentesis should be performed, followed by identifying the injured blood vessels of the

neck and halting the hemorrhaging, and only after this has been done should the intrathoracic stage of the operation be performed, if need be.

Fifteen of the patients died. The cause of their death was loss of blood accompanying injuries to vital organs and postoperative complications.

13124/9835

CSO: 1840/315

UDC 616.216.23-003.6-089.878

REMOVAL OF FOREIGN BODY FROM SPHENOIDAL SINUS AND BLUMENBACH' CLIVUS

Moscow VOPROSY NEYROKHIRURGII in Russian No 3, May-Jun 86
(manuscript received 31 Jan 85) pp 52-53

[Article by V. A. Khilko, Yu. K. Revskoy and A. S. Kiselev, Chairs of
Neurosurgery and of Otolaryngology, Military Medical Academy imeni S. M. Kirov,
Leningrad]

[Abstract] The case is presented of a 28 year old male with a 6 cm nail in the sphenoidal sinus and Blumenbach's clivus. Following stabilization of the vital signs and the general status of the patient, endonasal transseptal removal of the nail was carried out 2 months after the patient had been admitted. The surgery relied on a Soviet microscope allowing for a 2.5X magnification of the operating field, using basically the approach found successful in modern surgery on the pituitary gland. The patient was discharged 17 days after surgery in a satisfactory state without any neurological deficits. Figures 3, references: 8 Russian.

12172/9835
CSO; 1840/1091

UDC 615.214.31.03:612.766.1] (049.32)

PHARMACOLOGICAL TREATMENT OF FATIGUE

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 49, No 2, Mar-Apr 86
p 113

[Review by Professor I. I. Brekhman and I. V. Dardymov, candidate of medical sciences, (Vladivostok), of monograph "Farmakologicheskaya Korrektsiya Utomleniya" [Pharmacological Treatment of Fatigue] by Yu. G. Bobkov, V. M. Vinogradov, V. F. Katkov, S. S. Losev and A. V. Smirnov, Moscow, Meditsina, 1984, 207 pages]

[Text] The monograph under review deals with the pharmacology and mechanisms of action of a new class of therapeutic substances--stimulants of an "economizing" type: actoprotectors (gutamin derivatives, 2-mercaptobenzimidazole and cyclical derivatives of thiocarbamide) and, also, psychoenergizers (piracetam, mefexamide and others).

The monograph's authors, who are authoritative specialists in the field of pharmacology and biochemical pharmacology, have written a book that should "turn" the attention of pharmacologists and clinicians to "mildly" acting agents that have a positive effect on muscular and mental fitness for work in extreme conditions. Until recently, agents with a similar type of activity (energizers and adaptogens) were cited in reference and textbooks in the same section, "Central Nervous System Stimulants," with phenylalkylamines, lobeline and corazole. This monograph should put an end to the confusion in classification of so-called stimulants.

The authors correctly emphasize the basic feature that distinguishes actoprotectors from phenamine type stimulants and hormonal preparations. It is the fact that actoprotectors themselves do not activate the genetic apparatus; rather, they speed up the natural course of protein synthesis processes. Such a mechanism differs radically from the activity of glucocorticoids. This property of actoprotectors is indicative of their relationship with adaptogens of the ginseng, eteutheroccus, tevzei and other preparations of natural origin. Actoprotectors have a more physiological action on the body and that is why they don't cause side effects.

The authors have analyzed all so-called stimulants and assigned an appropriate position to each one. They cite their own classification of this family of agents which, on the whole, reflects objective reality. Nevertheless, there are many factors which it seems to us, allow for the inclusion of "Plant Preparations With Various (often unclear) Mechanisms of Activity," especially adaptogens, in the second section, "Economizing Type Stimulants."

The impression is created that the authors are restricting (possibly, out of prudence) the scope of actoprotector and psychoenergizer pharmacology. They studied the effect of the new actoprotectors chiefly on the central nervous system and muscular activity. Apparently, the agents they call "energizers" have to do with a wide range of pathological states which are accompanied by a stress reaction. It seems to us that many of these preparations can be consolidated into the "stress protector" group; the term "adaptogen," suggested by N. V. Lazarev, also fits them.

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CSO: 1840/040

UDC 616.2+617.7]-099-02:615.9

TREATMENT OF INJURY TO ORGANS OF RESPIRATION AND EYES RESULTING FROM
INHALATION OF IRRITANTS

Moscow SOVETSKAYA MEDITSINA in Russian No 8, Aug 86 (manuscript received
24 Oct 85) pp 81-83

[Article by N. I. Savvaitova, I. M. Bel'fer, L. N. Kulikova and A. A. Krupalov,
Moscow Oblast Order of Labor Red Banner Clinical Scientific Research
Institute imeni M. F. Vladimirskiy]

[Abstract] Production accidents can result in inhalation by workers of
ammonia, chlorine, bromine, hydrogen fluoride, silicon tetrafluoride,
phosgene, dimethylsulfate and isocyanates, all irritants affecting the eyes
and organs of respiration. The authors share their experience in treating
57 patients with acute injuries of this type following poisoning by the
substances mentioned. Medical and surgical treatments are briefly described.
No case histories are presented. References 13: 12 Russian, 1 Western.

6508/9835

CSO: 1840/1057

UDC 615.214.32.009.036.11.08

CLINICAL COURSE AND TREATMENT OF ACUTE INTOXICATION WITH AMITRIPTYLINE

Moscow KLINICHESKAYA MEDITSINA in Russian No 8, Aug 86 (manuscript received
28 Mar 85) pp 108-113

[Article by A. S. Savina, Ye. A. Luzhnikova, I. Ye. Galankina and N. A. Vagin,
Republic Center for Treatment of Acute Poisoning, Scientific Research
Institute of Emergency Medicine imeni N. V. Sklifosovskiy, Moscow]

[Abstract] An analysis is presented of 174 male and female patients,
15-50 years old, hospitalized for acute intoxication with amitriptyline with
life-threatening cardiovascular manifestations. Of the cohort, 21 patients

(12.06%) died due to cardiovascular insufficiency or cardiac arrest. The blood levels of amitriptyline ranged from ca. 2.6 to 6.3 mg/ml, with the concentration correlated with sinus tachycardia (74.1%), sinus bradycardia (6.9%), atrioventricular block (7.4%), intraventricular conductivity delay, (14.3%), intraventricular block (14.3%) and various changes on the EKG (30.4%). The therapy was generally supportive and designed to maintain cardiac function, with primary importance accorded to intracardiac administration of heart stimulants. Figures 1; tables 2; references 10: 4 Russian, 6 Western.

12172/9835
CSO: 1840/1094

UDC 615.214.099.036.11.065:612.017.1

EFFECTS OF ACUTE INTOXICATIONS WITH PSYCHOTROPIC AGENTS ON IMMUNITY

Moscow KLINICHESKAYA MEDITSINA in Russian No 9, Sep 86 (manuscript received 4 Dec 85) pp 111-114

[Article by V. G. Ananchenko, Ye. A. Luzhnikov, Yu. D. Alekhin, A. V. Mamonov and N. V. Reshetova, No 2 Chair of Internal Diseases, 2nd Therapeutics Faculty, 1st Moscow Medical Institute imeni I. S. Sechenov; Republic Center for Treatment of Acute Poisoning, Moscow City Scientific Research Institute of Emergency Medicine imeni N. V. Sklifosovskiy]

[Abstract] Immune status was evaluated in the case of 57 patients, 19-64 years old, in the course of acute intoxication with various psychotropic agents. The general features of patients examined within hours of onset of side effects due to barbiturates, amitriptyline, or benzodiazepines consisted of depression of total lymphocyte and T and B populations, as well as of serum levels of IgG to ca. 5.5-9 g/liter (vs. 23.80 g/liter control value). The degree of immune suppression was unrelated to the kind of drug, but positively correlated with the severity of the clinical manifestations. In addition, pneumonia was seen to develop with increasing frequency in patients with the more pronounced immunosuppression and markedly elevated circulating immune complexes. References 6: 5 Russian, 1 Western.

12172/9835
CSO: 1840/1087

CLINICAL IMMUNOLOGY WORK-UP AND HYPERSENSITIVITY ASPECTS OF URTICARIA
INDUCED BY PYRAZOLINE DERIVATIVES

Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 57, No 10, Oct 86
(manuscript received 21 Nov 85) pp 76-78

[Article by Yu. A. Poroshina, L. V. Luss, V. B. Gervaziyeva, I. G. Venidiktova,
V. N. Androsoy and Li Sun Chkhor, Institute of Immunology, USSR Ministry of
Health, Moscow]

[Abstract] A clinical work-up was conducted on 35 patients, 18-65 years of age, with urticaria due to use of pyrazoline-based drugs. In vivo leukocyte migration studies were positive with the suspect drugs in all 35 patients, depending on the suspect drug. In addition, the mean IgE in the cohort was elevated, as were the other Ig fractions and all of the subpopulations of lymphocytes. Furthermore, there was marked depression of D-phagocytizing neutrophils, a fact used to explain the unusually high incidence of multiple chronic infectious foci in this class of patients. Finally, pyrazoline-related urticaria was accompanied by depression of C'3, apparently due to activation of the alternate pathway of complement activation. Figures 2, references 3: 2 Russian, 1 Western.

12172/9835
CSO: 1840/1111

CHEMICAL ASYMMETRY OF BRAIN

Moscow SCIENCE IN THE USSR in English No 1, Jan-Feb 87 pp 21-29

[Article by Acad. Ye. Chazov, director, National Cardiology Research Center, USSR Academy of Medical Sciences; Acad. N. Bekhtereva, director, Institute of Experimental Medicine, USSR Academy of Medical Sciences; G. Bakalkin, Cand. Sc. (Biol), Head of Neuropharmacology Department, Central Research Laboratory, USSR Ministry of Health; and G. Vartanyan, D. Sc. (Med), head of Physiology Department, Pavlov Institute of Experimental Medicine, USSR Academy of Medical Sciences]

[Text] The problem of the external symmetry and internal asymmetry of the brain has in recent years been commanding ever greater interest among neurobiologists and researchers in several other areas concerned with higher nervous activity.

The external symmetry of the brain is related to the need for a symmetric organization of the mechanisms of movement. This enables a living being to move rectilinearly in space, reaching its chosen destination, and negotiating obstacles. Evolution carefully selected individuals according to this character, and this resulted in the dominance of bilaterally symmetric animals. Such a symmetric structure has to be "built into" the brain as an instrument of orientation in the surrounding world, assuring the symmetric functioning of the locomotor mechanisms.

What strikes us in the brain's external appearance first of all is its division into two tightly adjacent hemispheres, each a mirror image of the other. Yet despite this outward similarity, the hemispheres of the human brain differ in their functions: most people place greater reliance on the right hand, which is controlled from the left hemisphere. It is the left hemisphere too that controls speech and its comprehension*. The right hemisphere is the dominant one in perceiving complex visual images, and in expressing and recognizing emotions. All this is known as the functional asymmetry of the brain.

The microstructural and neurochemical distinctive features of its right and left halves are being investigated by many specialists in neurophysiology, neurochemistry, psychology, and psychiatry.

*See: E. Kostandov, "The Conscious and the Unconscious", Science in the USSR, 1986, No 5.

The subject of the present article is a new, hitherto unexplored phenomenon: the fundamental chemical asymmetry of the brain. What it boils down to is that certain endogenous (that is, originating within) regulating substances interact primarily with structures in the brain's left or right hemisphere, and this results in a one-sided physiological response.

Scientists have been trying to identify such regulators, study the mechanism of their action, formulate a hypothesis concerning their biological role, and suggest ways in which these substances could be used medically.

The results reported here have been obtained at the Physiology Department of the Pavlov Institute of Experimental Medicine of the USSR Academy of Medical Sciences, the Neuropharmacology Department of the Central Research Laboratory of the USSR Ministry of Health, the Experimental Cardiology Institute of the National Cardiology Research Center of the USSR Academy of Medical Sciences, and the Biology Faculty of Moscow University.

There are various approaches to brain studies. One of them consists in damaging certain brain structures in laboratory animals and noting the resulting changes. Physicians, who deal with human patients, seek to help those of them who have been subjected to similar "experiments" by cerebral insult or injuries. The reasoning of the investigator and the physician is in both cases simple: the region of the brain that has been damaged is normally essential for whatever the patient is now unable to do.

Damage to the brain triggers compensatory processes, and the possibility should not be ruled out that this gives rise to specific substances that regulate these processes. Such substances could influence not only damaged but also normal cells to make them take over the functions of the damaged ones.

Let us consider the case of stroke, an acute impairment of the blood circulation in the brain or the spinal cord, causing persistent damage to structures in the central nervous system. If specific chemical regulators do indeed arise in this case, it should probably be possible to detect them in the cerebrospinal fluid, which bathes the various structures of the brain. What if our hypothesis were put to an experimental test--by administering to an animal some cerebrospinal fluid from stroke patient?

Accordingly, some cerebrospinal fluid taken from a patient with stroke of the right hemisphere and paralysis of the left arm and leg was introduced into the spinal cord of a rat (Fig 1). But first the animal's spinal cord had been transected in its upper part to rule out any influence of the brain in processes caused by the cerebrospinal fluid. No sooner was the fluid introduced than the hind limbs of the rat, which had been in symmetric postures, moved, one of them flexing more than the other. In other words, the posture of the rat's hind limbs developed an asymmetry. Surprisingly, the flexed limb was on the same side of the body as was the patient's paralyzed leg. Similar coincidences were recorded in experiments with the cerebrospinal fluid of many patients with stroke of the left or right hemispheres, or with craniocerebral injuries. In this way, the cerebrospinal fluid was for the first time found to

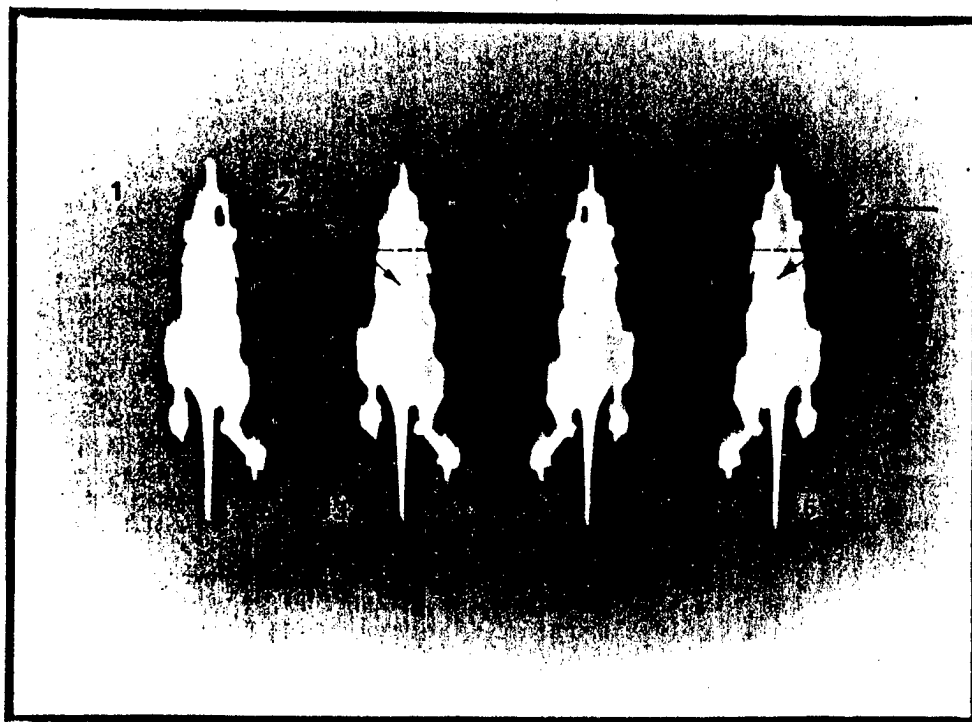


Fig. 2.
Extracts of animal
brain with one-
sided injury, when
administered to
other animals of
the species,
contribute to the
development of
posture
asymmetry.
1—damage to
right side of brain;
2—brain extract;
3—flexion on left
side;
4—damage to left
side of cortex;
5—flexion on right
side.

An account of the research that followed requires a brief explanation concerning a recently discovered class of biological regulators, the neuropeptides. They are "in charge" of behavior and memory, endocrine functions, cardiovascular activity, etc. The most interesting of the neuropeptides are the opioid group (the enkephalins, endorphins, and dinorphins), which bear a similarity to morphine, a narcotic drug, derived from the opium poppy, that reduces pain and induces a state of euphoria. Some 15 years ago, when the mechanism of morphine's action began to be studied in earnest, it was suggested that in the animal brain there exist receptors, molecules on the cell surface that recognize narcotic substances and distinguish them from a host of other substances. The morphine receptors detected on the surface of nerve cells were called opiate receptors. But why should the animal and human organism have specific receptors of morphine, a substance of plant origin? (Fig 3)

Another supposition was then voiced: that in the animal and human organism there were compounds that reacted with opiate receptors. These substances were isolated in several laboratories of the world and were identified as peptides: enkephalins, endorphins, and dinorphins. Exogenous (i.e., of external origin) morphine actually imitated the action of such endogenous peptides.

The discovery of the enkephalins triggered a vigorous study of the opiate receptors. Several types of these receptors were found: the mu-delta-, kappa, and sigma-receptors. The mu-receptors bind morphine and endorphin tightly, i.e., most specifically; the delta-receptors, the enkephalins, and

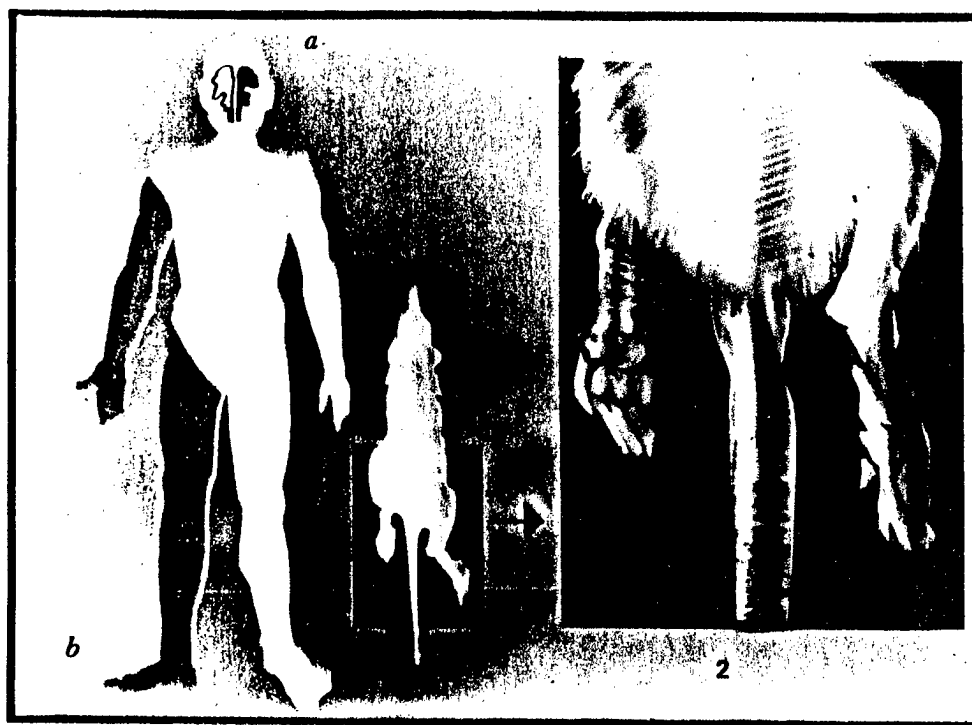


Fig. 1.
Spinal fluid from
patient with one-
sided stroke
produces posture
asymmetry in
animal.
a)—Stroke on
right side;
b)—paralysis
of left side.
1 — administration
of spinal fluid;
2 — flexion of left
limb.

contain some kind of chemical factors containing information about the side of a brain injury and causing a posture asymmetry, i.e., acting most probably on neurons situated to the left or right of the brain's plane of symmetry.

What kind of chemical factors were these? And what was their biological role? To answer these questions it was necessary to obtain an amount of the substance sufficient for analysis. Accordingly, it was decided to see whether it could be had from the brain of animals with one side of the brain injured.

Some time after the motor zone of the cerebral cortex or the spinal cord of a rat had been damaged, an extract of its brain was obtained (Fig. 2). When it was administered to healthy rats, they too developed an asymmetry in the posture of their hind limbs. A brain extract from an animal with a damaged cortex of the left hemisphere caused a flexing of the right limb; from an animal with a damaged cortex of the right hemisphere, of the left limb. The side on which the donor's brain had been damaged thus determined the side of the recipient's response.

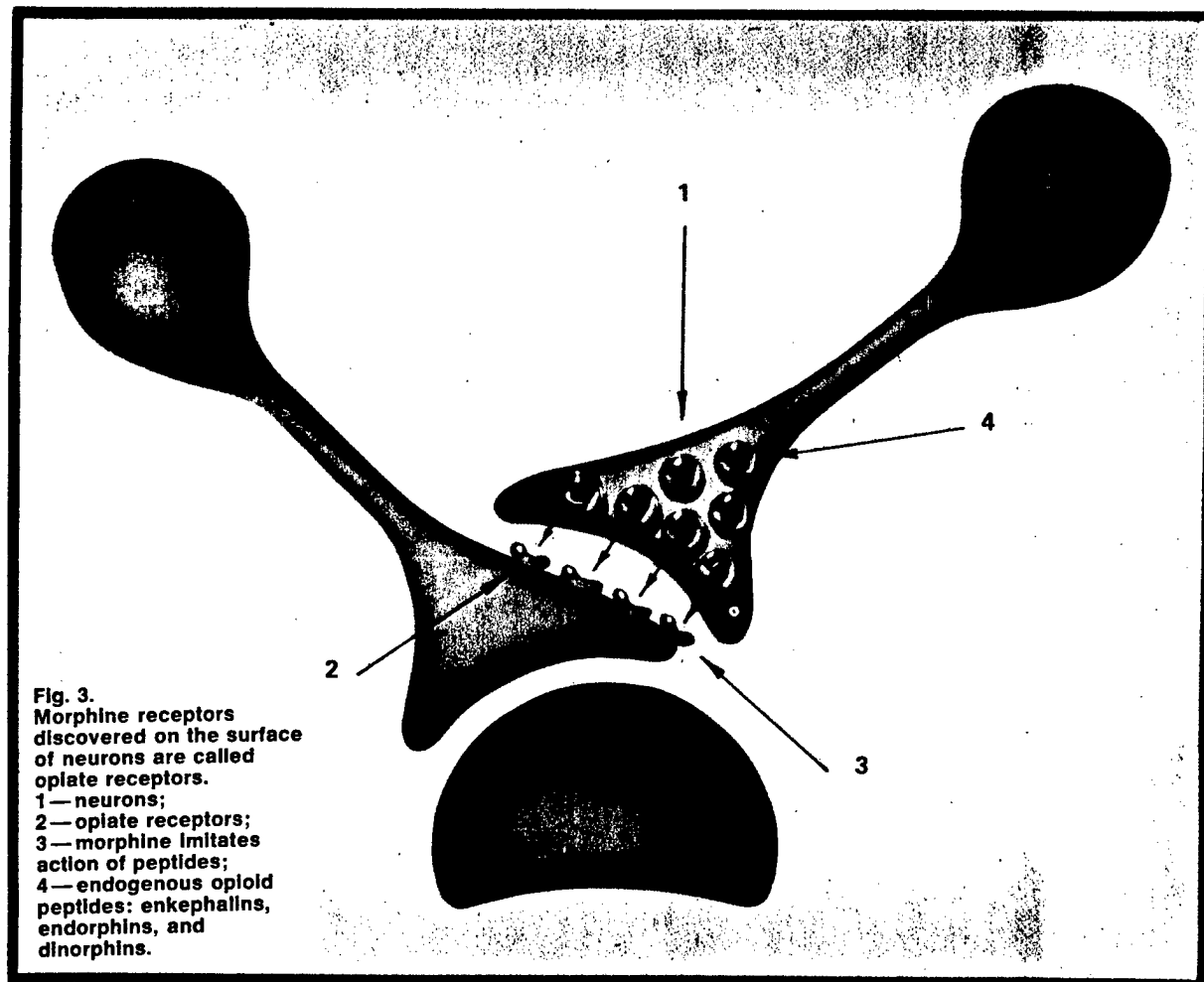
To establish the chemical nature of the factors inducing this asymmetry, we treated the brain extract with enzymes that break up peptides and proteins, and also RNA. It was found that the activity of the asymmetry factor was unaffected by treatment with enzymes that decompose RNA, but was affected by treatment with trypsin, which causes peptidolysis. Besides this, the asymmetry factor is thermotolerant: its activity is unimpaired by boiling. These data suggested that it was of a peptide nature.

Which peptides could be responsible for the asymmetry?

the kappa-receptors, the dinorphins. The compounds that react vigorously with receptors are usually termed agonists, and morphine is thus a mu-agonist. In the body the opiate receptors are involved in regulating different processes: the mu-receptors, the perception of pain; the delta-receptors, the control of respiration, and the kappa- and sigma-receptors, the control of emotions and the endocrine system.

Since the factors responsible for asymmetry turned out to be peptides, and we were in possession of pure compounds that reacted with receptors with a high affinity for peptides, we decided to see whether they produced asymmetry. Opiate agonists were introduced into the spinal cord of rats. As stated above, these compounds react most specifically with opiate receptors, and therefore it is they--and not endogenous opioid peptides--that are extensively used in experiments.

It was found that the administration of a mu-agonist did not lead to the development of posture asymmetry. The delta-agonist and sigma-agonist did cause



a flexion primarily to the left limb; the kappa-agonist, of the right limb. The symmetrically situated neurons regulating the movement of the muscles of the left and right hind limbs thus differ in their sensitivity to opiate agonists. This points to an asymmetric distribution of the opiate receptors in the spinal cord of the rat: on one side there appear to be primarily receptors of the kappa-type; on the other, of the delta- and sigma-types. The mu-type receptors seem to be distributed symmetrically.

The physiological response to animals to several chemical compounds hence turned out to be asymmetric: the response to a compound of one type is primarily from the left side; of another type, from the right side. But could it be demonstrated directly that asymmetric structures responded differently to a chemical signal and recognized delta-, kappa-, and other opiate agonists?

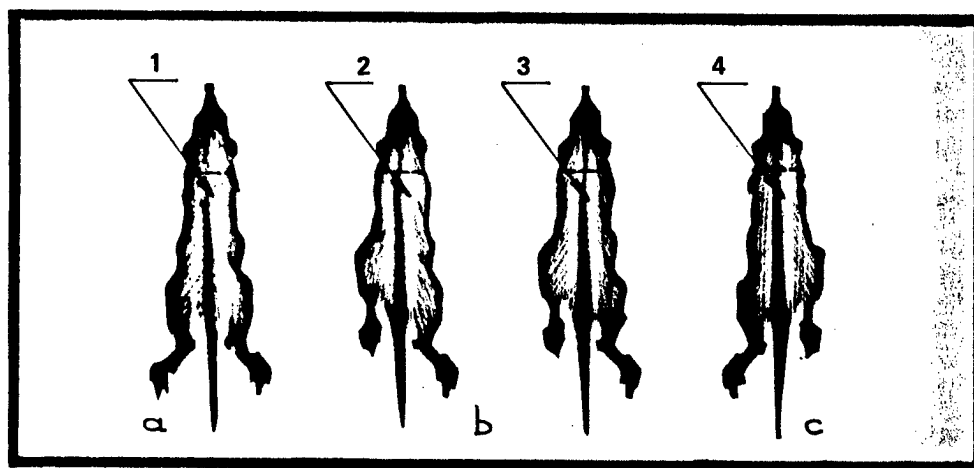
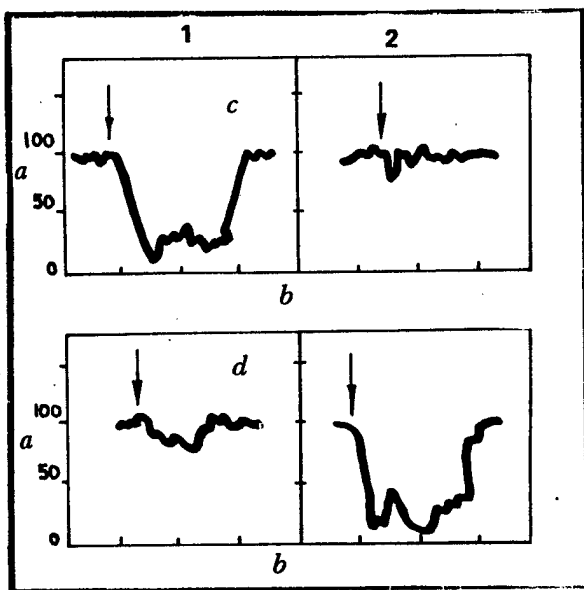
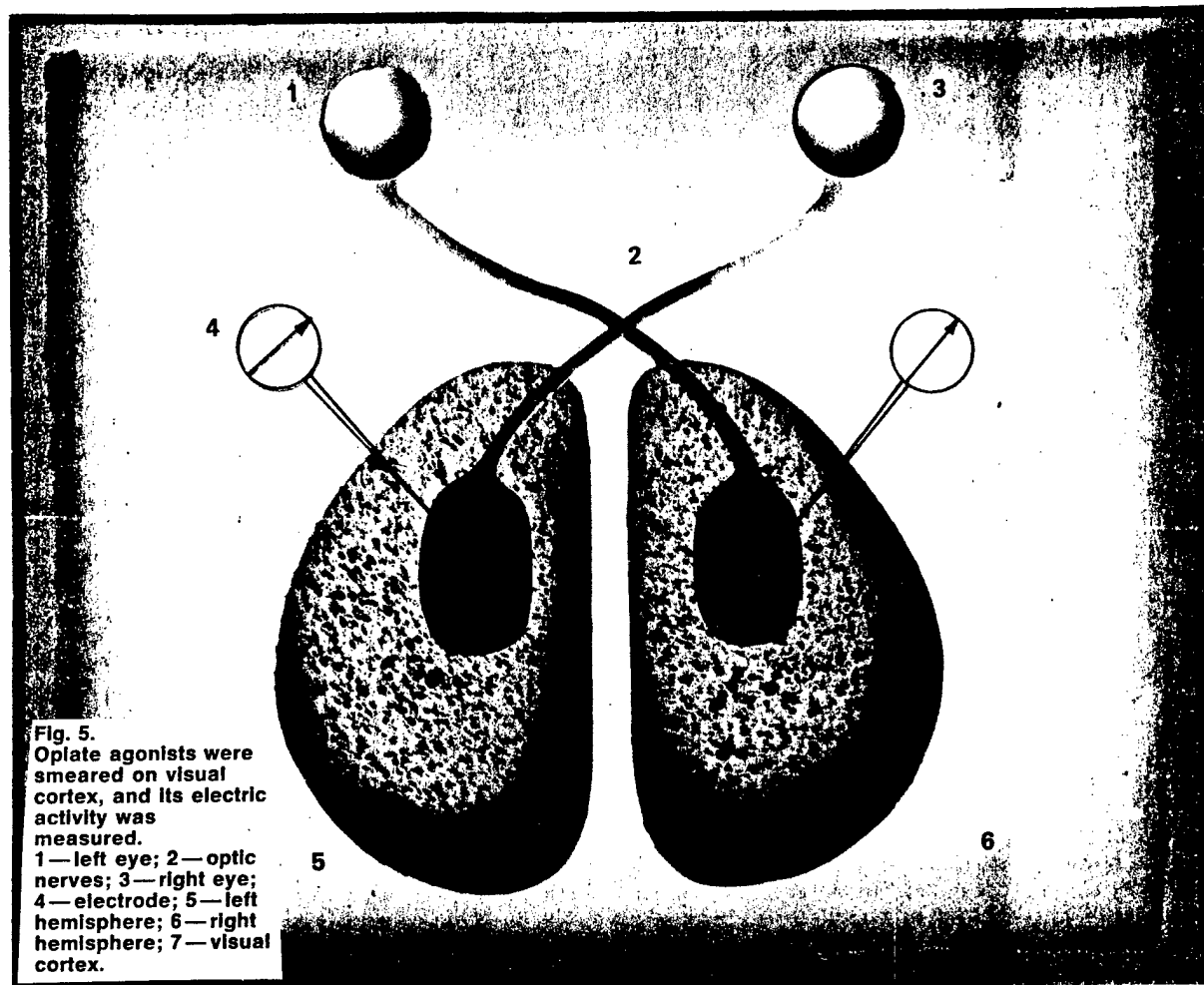


Fig. 4.
Opiate agonists
produce posture
asymmetry.
1—mu-agonist;
2—delta-agonist;
3—sigma-agonist;
4—kappa-agonist:
a)—no asymmetry;
b)—flexion on left
side;
c)—flexion on right
side.

Evidently, this problem could be solved by physiological and biochemical methods all the more easily, the simpler was the structure investigated, i.e., the fewer were the types of nerve cells of which it consisted. We chose a very simply structured object: the visual cortex of a turtle. It evolved for the first time in reptiles and consists of a single layer of nerve cells symmetrically arranged in the left and the right cortex. Data in the form of electric pulses travel along the optic nerve to the appropriate region of the cerebral cortex: from the left eye primarily to the right cortex; from the right eye, to the left cortex. Such a pulse alters the electric potential of the neurons of the visual cortex. The potentials of the left and right cortex can be compared if electrodes are applied to symmetric regions (Fig 5). Substances reacting with opiate receptors were smeared on the cortex, and their effect on the electric activity was then observed.

On the graph, time has been plotted horizontally and the induced electric potential vertically. It is quite clear that while the kappa-agonist suppresses the left cortex potential by 80-100 percent, the activity of the right cortex diminishes insignificantly. The delta-agonist inhibits the potential of the right, primarily visual, cortex. This testifies to the differing sensitivity of neurons to the substances investigated. Such differences

appear to be due to the asymmetric distribution of kappa- and delta-opiate receptors between the left visual cortex and the right.



Graph clearly shows kappa- and delta-agonists suppressing the electric potential of the cortex.
1—left cortex; 2—right cortex;
a—induced potential; b—time; c—kappa-agonist;
d—delta-agonist.

It proved possible to corroborate the neurophysiological findings by biochemical experiments. Radioactive opiate agonists of the kappa and delta types were applied to the surface of the brain, and it was then determined what amounts of these substances had been bound by the cells of the left and the right cortex. The kappa-agonist, suppressing the induced potential from the left side, was found to react best with the left cortex; the delta-agonist, inhibiting the potential from the right side, with the right cortex. This meant the opiate receptors were distributed asymmetrically between the left and the right visual cortex. On the left there were mostly kappa-receptors: on the right, delta-receptors.

The data obtained provide the first direct evidence of the involvement of the opiate receptors in the asymmetry of the brain.

A new type of asymmetry has thus been discovered. What it amounts to is that certain opioids are bound primarily with cells in the left half of the brain; certain others, in the right half. Such interaction, as we observed, gives rise to a one-sided physiological response. This type of asymmetry differs from hitherto known types, specifically, from the functional asymmetry of the brain.

Let us proceed now from the findings on asymmetry to a rather complicated point, but, probably, the most interesting of all: the biological significance of chemical asymmetry. As stated above, we have established that certain brain structures symmetric in shape differ in the peptide receptors they contain, a fact that may be related to the functional differences between the left side of the brain and the right. However, no data on different functions on the left side of the visual cortex and the right--still less, of the halves of the spinal cord--have as yet been obtained. The differences between these symmetric structures are probably due to the very fact that one half is the left half; the other, the right. In other words, the receptors of one type and the substances reacting with them may be markers primarily on the left side; the receptors of the other type, of the right side. But what is the purpose of these markers?

The brain of the vertebrates and most of the invertebrates is symmetric in shape. There is no doubt, therefore, about the existence of a mechanism that, during the development of the brain, controls the migration of cells, their processes, and sheets of cells from left to right and from right to left in relation to the vertical axis of the body. These developments are controlled chemically provided there are gradients of chemical substances and their receptors in these directions.

It cannot be ruled out that the asymmetrically arranged receptors and the peptides that react with them--the nerve cell markers--are one such gradient. This is, of course, a hypothesis. Data supporting it have been obtained in investigating the effect of opioids on the individual development of certain species of animals, e.g., the fish known as the spined loach (*cobitis taenia*), specifically on the development of symmetry in the shape of its brain. We chose the loach because the development of its embryos may be conveniently observed in laboratory conditions.

The agonists of the mu-, delta- and sigma-type opiate receptors, and other peptide and nonpeptide brain regulators and their analogs, were added to bowls containing loach embryos. It transpired that only the opiate sigma-agonist produced various deformities--all the other compounds had no such effect. While some of the discovered defects were symmetric, others were asymmetric. An analysis of the action of the sigma-agonist revealed the probable cause of the deformities: at early developmental stages the sigma-agonist distorts the shape and arrangement of the cells from which the brain subsequently develops. The sigma-agonist acts at the stage at which there is as yet no brain. Nor are there yet other organs--there has only just begun in the embryo a migration and specialization of like cells, which in future will give rise to the diversity of organs and tissues. The cerebral part of the embryo begins to form with an aggregation of cells and their migration toward a definite line, which in due course will become the axis of the body and brain of the embryo, i.e., will form the axial germ. It is shaped as a wide cellular band. In the presence of a sigma-agonist the germ acquires a cord-like shape, and its cells become elongated--polarized perpendicularly to the germ axis--in the left and the right direction.

Shown in Fig 6 are sections of the neural tube of an embryo at the level of the hindbrain at a later stage. The sigma-agonist (below) upsets the proportion between the height and width of the neural tube, which is compressed from the sides, as it were. Thus the sigma-type opioid intervenes at the initial stage in the process of brain formation, regulating it in a left-right direction in relation to the longitudinal axis of the body.

A problem of interest to us was the biochemical mechanism of the operation of the sigma-agonist. Were there any sigma-receptors, earlier found only in the brain, in the ova or embryos of the loach (before the emergence of nerve cells)? We investigated the possibility of membranes of the loach ova and embryos binding radioactive opiate sigma-, mu-, delta-, and kappa-agonists. It transpired that these membranes bind only sigma-agonists. The binding centers, in their biochemical characteristics, do not differ from the opiate sigma-receptors in the brain of mammals and fish.

All the signs thus point to a mechanism operating in the loach embryos that assures the symmetry of the brain in its development. It regulates the migration of the brain germ cells from left to right and from right to left. The regulation process may involve sigma-receptors found in the embryos. The exogenous sigma-agonist produces anomalies by disturbing the functioning of this mechanism.

Now let us return to the experiments with the extracts. As stated in the foregoing, extracts of animal brains with one-sided damage cause posture asymmetry in rats. The asymmetry factors in the extracts appear to be peptides. But which peptides? And how many of them are there?

The preparations were made from the brains of one thousand rats and were subjected to highly effective liquid chromatography, a technique for separating and analyzing mixtures. Purified fractions were then administered to animals, and the resulting asymmetry was measured. This revealed several fractions

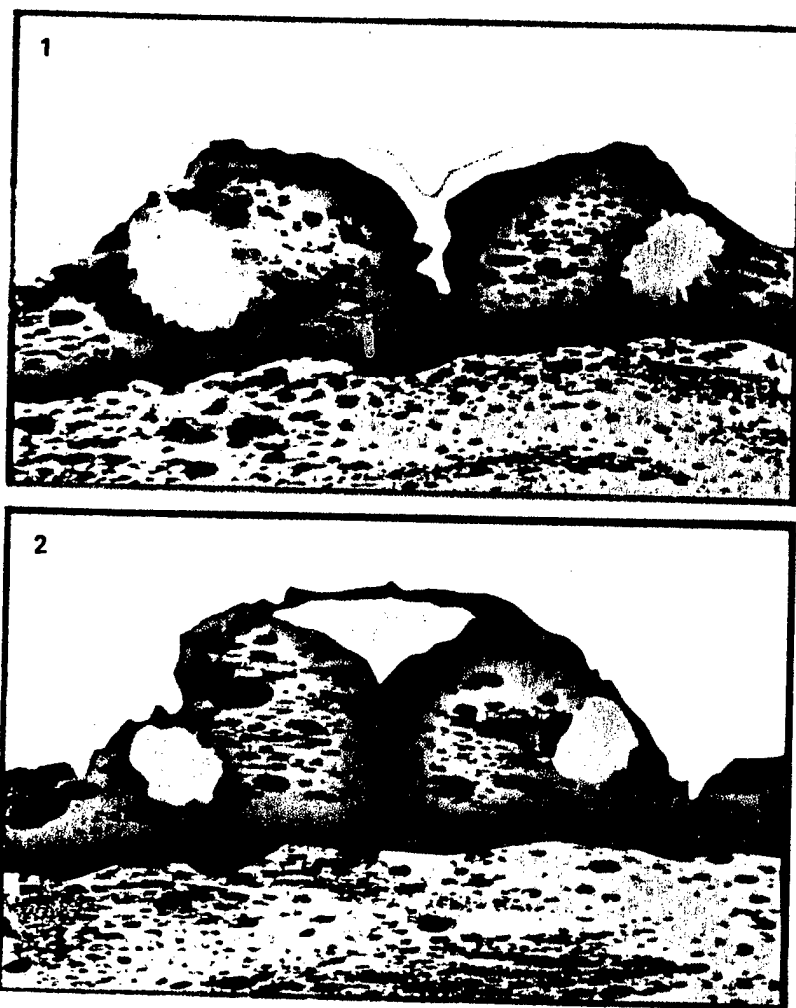


Fig. 6.
Section of neural tube
of loach embryo at the
hindbrain level.
— control
— brain section
(below) showing that
the administration of
the sigma-agonist
upsets the proportions
between the height
and width of the
neural tube.

containing asymmetry factors. Consequently, the extracts contained several compounds capable of producing brain asymmetry. The fraction with the maximum activity was again subjected to chromatography. The procedure yielded an amount of the pure substance sufficient for structure determination, and the substance, as expected, proved to be a peptide.

Quite unexpectedly the amino acid composition of the peptide coincided with that of the known peptide hormone arginine vasopressin, which regulates the water-salt metabolism and other processes. It is generated in an endocrine gland, the pituitary body, and in certain brain structures. When administered to healthy animals, synthetic arginine vasopressin, like the isolated factor, causes a posture asymmetry. The investigation therefore established that one of the compounds causing posture asymmetry is arginine vasopressin.

This means that two groups of peptides were found to produce asymmetry reactions: opioid peptides and arginine vasopressin. The possibility should not be ruled out that such an asymmetry is a fairly general property of the brain. It may involve neuropeptides of other types, and could extend to other brain

structures or even the brain as a whole as well as just the spinal cord and the visual cortex.

As clinicians and biologists, we, naturally, cannot but give thought to the possible medical applications of our research. Recall, as was stated earlier in this article, that the spinal fluid of patients with one-sided motor disturbances induces posture asymmetry in rats. Do not the chemical factors that carry information about the side of the damage also regulate compensatory processes on that side? Or is not, perhaps, their action directed at symmetric cells of the undamaged hemisphere to induce them to take over the functions of the impaired cells? If the asymmetry factors do indeed have a bearing on compensation, what effect will they have on a just damaged brain?

We conducted new, special-purpose experiments. The motor zone of a cat's cortex was damaged. During the acute period following the injury the animal's movements were impaired. But when the cerebrospinal fluid of another cat, which had suffered a similar injury and had compensated for the motor impairment, was administered to the animal, its functions were restored.

There is thus good reason to think that the chemical substances producing this effect will be of promise in developing drugs for treating patients with one-sided stroke or injury.

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CSO: 1840/754E

SELECTIVE BLOCKING OF CHEMORECEPTOR CHANNELS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Feb 87 p 4

[Article by V. Lagovskiy: "In the Sights--Ion Channels"; paragraph 1, SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] Yesterday the latest discovery was entered in the USSR State Registry under No 329. Its authors, V. Skok, A. Selyanko and V. Derkach are scientists at the Ukrainian Academy of Sciences Institute of Physiology imeni A. A. Bogomolets.

Why does a particular kind of medicine help a person? If you ask this question of a practicing doctor, you may not even get an answer. Even the researchers who create a new drug sometimes do not know the mechanism of its action. What effect a chemical compound evokes is well known, but how and why is a puzzle. Could it be that this is not that important?

"If a phenomenon is understood," says Ukrainian Academy of Sciences Academician V. Skok, "it can be used with greater effect; medicine can be created which will hit the target precisely."

For a long time it seemed to medical workers that they had found one of these targets in the body. Nerve cells "communicate" with one another in the language of chemistry. Some manufacture complex compounds, others receive them with the aid of large protein molecules, called chemoreceptors, on their surface. Each chemical parcel to their address is a distinctive command to open a microscopic channel penetrating the cell wall. Ions rush through this channel. Thus a chain is set up which transmits stimulation in the nervous system. In many diseases it is necessary to eliminate it. For example, when pressure is increased, it is necessary to break the chain through which signals pass from the brain to the blood vessels. But how?

It is logical to propose that it is necessary to close the ion channels. And medical workers "tricked" the cell, sending their own medicine-package to the recognizing centers of the chemoreceptors. After all, it was felt that they would be the most sensitive to outside influences. This way turned out to be far from the best.

The Ukrainian scientists discovered that the ion channels themselves are incredibly sensitive to chemical compounds. And they do not have to be controlled through intermediaries. In other words, the channels can...simply close up, if a drug contacts them directly. Furthermore, it turned out that many medicines do exactly that, but, alas, not at full strength. Due to the fact that they are not sent to that address.

"Of course, the new target is much smaller than the previous one," says V. Skok, "but that is where its virtue lies. The ion channels in different cells are distinct from one another. In order to block them, different chemical compounds are needed. This means that it is becoming possible to create drugs which will fight the illness precisely and delicately -- thereby not closing all the channels at once, but only the necessary ones."

The work of the Ukrainian scientists has explained the way in which medicines act on the nervous system, and pointed out fundamentally new approaches to creating them. Interesting possibilities have opened up for medical workers. The idea is this: to treat, for example, not the heart, liver, or kidney, but the nervous system which regulates their work. Scientists hope that by controlling the ion channels using the new drugs it will be possible to fight against many diseases more successfully.

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CSO: 1840/514

MODULES: FUNCTIONAL UNITS OF VISUAL BRAIN AND THEIR ROLE IN VISION

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian
Vol 73, No 2, Feb 87 (manuscript received 2 Sep 86) pp 202-210

[Article by V. D. Glezer, Laboratory of Visual Physiology (Headed by V. D. Glezer), Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] The concept of cortical modules as the functional units of the sensory neocortex is further developed on the basis of analysis of new experimental data on the example of the visual brain, including those areas of the cortex which participate in a full description of the visual signal. The work attempts to show how the modular structure of the visual brain supports the performance of higher visual functions, i.e., which neuron mechanisms form the basis of visual objective thinking. The visual cortex is shown to cover the visual field with networks of modules with cells of various sizes. Within each cell, the image is described by a limited set of harmonics. Although a full picture of the spatial relationship of the nets of modules, their topologic representation in the cortex and space-frequency-orientation pattern cannot be described, it can be shown that it is an ordered one. All of the results described form a direct proof of the piecewise quasi-Fourier expansion performed by the linear neurons of a module. Modules are not separate units, but the set of modules forms a system. The module is a universal unit of the neocortex, not of the visual brain alone. It is used for separation and description of events, or in the visual system, patterns, coded descriptions of objects. Figures 4; references 24: 13 Russian, 11 Western.

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CSO: 1840/800

INFLUENCE OF TRANSCRANIAL NONINVASIVE STIMULUS OF ANTINOCICEPTIVE BRAIN
STRUCTURES ON REPAIR PROCESSES

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian
Vol 73, No 2, Feb 87 (manuscript received 13 Aug 86) pp 223-229

[Article by O. B. Ilyinskiy, V. P. Lebedev, A. B. Savchenko,
A. I. Solovyeva and S. Ye. Spevak, Laboratory of Cell Physiology (Headed
by O. V. Ilyinskiy), Institute of Experimental Cardiology, All-Union
Cardiologic Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Opioid peptides can accelerate repair processes in various
tissues and structures, including the gastrointestinal tract, nerve tissue
and the skin. One method of stimulating opioid structures is noninvasive
transcranial electrical stimulation, which is used clinically for analgesia
and causes the concentration of β endorphine in the blood and fluids of
animals and man to rise significantly. This article studies the influence
of transcranial electrical stimulation of the antinociceptive system on the
process of healing of skin wounds in rats. Experiments were performed on
118 male Wistar rats from which a skin flap was removed in the area of the
back. Transcranial stimulation at analgesic parameters caused a reliable
(up to 20%) acceleration of the healing process and reduction in the total
healing time. Transcranial stimulation at nonanalgesic frequencies
(50 and 90 Hz rather than the analgesic 70 Hz) caused no changes in rate
of wound healing. Naloxone incompletely blocked the wound healing effect of
electrical stimulation. Figures 3; references 20: 17 Russian, 3 Western.

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CSO: 1840/800

PAPER WORK DELUGE IN SOVIET HEALTH SERVICE

Moscow IZVESTIYA in Russian 30 Sep 86 p 4

[Article by S. Burenkov, USSR Minister of Health, under rubric "In Reponse to an IZVESTIYA Article": "Incomplete Response" and IZVESTIYA's response]

[Text] The USSR Ministry of Health has considered the article "Case History" and concedes that it is generally correct in its delineation of serious shortcomings in the working of the ministry's staff.

After publication of the article the ministry issued an order designed to develop a measure to decrease the amount of time spent by physicians seeing patients in out-patient polyclinics and in-patient institutions in filling out medical forms. A commission was organized, to be chaired by O. Shchepin, first deputy minister. Members of the commission include responsible staff members of the USSR Ministry of Health, a number of directors of leading medical scientific research institutions, the heads of general health facilities, and practicing physicians.

The commission has considered proposals from the ministries of health of all the union republics, over 200 proposals from chief physicians of general health facilities, and also more than 100 proposals from citizens, all concerning decreasing the time spent filling out medical forms.

As a result of studying all of the material presented, and an audit of a number of general health facilities, we have established that a large number of general health facilities have over 50 different types of unapproved medical forms.

The overwhelming majority of these do not mention the amount and quality of the medical aid to be given, and thus are not used for evaluating the operation of the department or the institution as a whole. Some primary medical documents duplicate each other.

At the same time, in order to decrease the time wasted by physician and mid-level medical personnel, many health agencies and institutions have developed and adopted rational systems for handling medical documentation. Thus, within the last decade, the majority of general health facilities of the LaSSR have made extensive use of dictaphones for taking medical histories and completing

a number of types of medical forms. As a result of this, according to data from the Latvian Ministry of Health, each doctor saves 1.5 hours of time per day, which helps improve the quality of treatment and diagnosis. This method is used in many out-patient polyclinics and in-patient facilities throughout the union republics.

To encourage extensive adoption of dictaphones for completing medical forms in general health facilities, conferences and seminars will be held in the second half of 1986 and the first half of 1987 for responsible staff members of the ministries of health of the union republics, and chief physicians of republic, oblast, and kray hospitals. A set of documents has been developed and sent to all union republics concerning setting up, running, and using dictaphone centers in general health facilities. The Ministries of Health of the union republics have been tasked with setting up dictaphone centers in health care facilities in 1986-1988.

To curtail time lost by physicians and mid-level medical personnel, the Ministry of Health has issued an order which abolishes 23 forms of primary medical documentation. In addition, this order instructs the appropriate division of the USSR Ministry of Health to complete work in consolidating a number of overlapping medical forms and shortenting a number of others. A review has been completed of the "Hospital Patient Chart," "Out-patient Chart," "Pediatric Chart," and "Child Development Chart," which will be introduced on 1 January 1987.

This same order categorically forbids introduction of any medical documentation in health care facilities which has not been approved by appropriate orders of the USSR Ministry of Health.

The All-Union Scientific Research Institute of Social Hygiene and Health Care Administration imeni N.A. Semashko has been asked to increase their work on computers to process medical statistical data at the level of the general health facility.

The USSR Ministry of Health is continuing its work to develop and utilize measures directed at further decreasing time spent by medical personnel on medical documentation.

Statistical reporting to the state required of health care facilities has also been curtailed by 31.8 percent of the total number of indicators.

[IZVESTIYA'S Reply]

This reply lists the measures undertaken by the ministry after reading our article. And they seem to want the matter to end there! However, certain questions remain unanswered. First, why was there no evaluation of the proposal made by Dr. S. Slinin? The answer says much about the dictaphone method for taking a case history. But why is the open method, which, we note, is significantly less expensive, not considered worthy of attention? There is not a word about this method in the Ministry's answer.

This is even harder to understand in light of the fact that, after the publication of our article, USSR Minister of Health, S. Burenkov turns out to have signed an order about performance of an experiment in the city of Kharkov to evaluate the open method for taking a case history as proposed by Slinin. Doctor Slinin has kindly allowed us to see a copy of the order. It defines the timeline for the experiment, the facilities to be used, and the people responsible for performing it. Dr. Slinin will also participate in the experiment. So why did the Ministry of Health not tell the paper anything about this?

And also we would like to know what conclusions were drawn with regard to the personnel of the Ministry who for decades sent the practicing physician irresponsible answers [to his proposal]. Isn't this instance of a quarter century of red tape a signal to analyze the way correspondence is conducted, and to change the way the ministry operates? These questions, arising directly from the IZVESTIYA article, also remain unanswered in the official letter. Why? Why, after agreeing in general terms that the criticism is justified, does the minister cut short the discussion about the way the ministry operates? Is it not this "?????" which both permits agreeing with criticism and points the finger at specific staff members who are guilty of red tape and bureaucracy?

The editors await an answer to the questions posed.

9285

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UDC 616.07:65.011.56(048.8)

AUTOMATED DIAGNOSTIC SYSTEMS IN MEDICINE

Moscow SOVETSKAYA MEDITSINA in Russian No 8, Aug 86 (manuscript received 18 Mar 85) pp 47-51

[Article by B. A. Kobrinskiy and G. S. Bolshakova, Moscow Scientific Research Institute of Pediatrics and Pediatric Surgery, RSFSR Ministry of Health]

[Abstract] This review of Soviet and Western literature discusses the history and status of automated diagnostic systems in medicine. Three stages are arbitrarily distinguished in the development of automated systems in clinical medicine: 1) The development of methods for machine diagnosis and the first attempts at automation of the diagnostic process; 2) The creation of information models of clinical pathologies; and 3) The creation of systems for automation of the diagnostic and therapeutic process in clinical medicine. The fourth stage is that of creation of consultative diagnostic systems utilizing the logic of medical thinking to assist physicians. Numerous experiments in the Soviet Union and abroad are described, resulting in the conclusion that the computer can serve only as an adviser to the physician, providing additional data and suggestions which the physician uses to make the diagnosis, retaining full responsibility for the diagnosis. the use of microcomputers in medical offices and in systems for massive preventive examinations is most promising. An automated system of this type has been developed in the Soviet Union, and is intended for preventive examination of the population to reveal ten groups of the most common diseases. Use of the system can improve the quality of such examinations, providing for objective gathering of data on the true status of health of various groups of the population. References 73: 50 Russian, 23 Western.

6508/9835

CSO: 1840/1057

BIOLOGICAL MARKERS OF ALCOHOL USE

Moscow KLINICHESKAYA MEDITSINA in Russian No 6, Jun 86 (manuscript received 10 Jul 85) pp 128-135

[Article by A. Ye. Uspenskiy, All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, Moscow]

[Abstract] A review is presented of the current studies designed to identify biological markers of alcohol use. Although certain biochemical parameters may vary in case of chronic alcohol abuse, by and large they have to be evaluated in terms of deviation from a normal range. Thus, for example, one of the more typical correlates of alcohol abuse is represented by elevation of blood levels of gamma-glutamyltransferase activity. Another important indicator is the mean corpuscular volume of erythrocytes. The former falls to normal levels in 7-10 days after alcohol intake is discontinued, and the latter parameter in 2.5 to 3 months. Tabular data are presented to summarize a variety of other biochemical and physiological factors that may reflect alcohol abuse. References 53: 7 Russian, 46 Western.

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ORGANIZATION OF MATERNAL AND PEDIATRIC HEALTH CARE IN AFGHANISTAN

Moscow SOVETSKOYE ZDRAYOOKHRANENIYE in Russian No 9, Sep 86
(manuscript received 8 Aug 85) pp 61-66

[Article by Nabi Kamyar, Minister of Social Health, Democratic Republic of Afghanistan, and P. P. Petrov, doctor of medical sciences]

[Abstract] With the April 1978 revolution in Afghanistan, the health of the population has continuously improved, particularly as it pertains to mother and child care. The number of special clinics and hospitals is on the increase, as well as the number of beds in general hospitals assigned to the obstetrical and pediatric wards. These developments reflect the high birth-rate in Afghanistan (48.1/1000) and the fact that almost half of the population (44.6%) is below 15 years of age. A significant cornerstone was set for further medical expansion in pediatric health care when a pediatrics faculty was established at the Kabul Medical Institute in 1985. It is said that none of these accomplishments would have come to pass had it not been for the political and social changes brought about by the April 1978 revolution and the encouragement and assistance from the USSR. Figures 2.

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REVIEW OF BOOK BY A. S. BOMBERGER AND B. A. DENNENFELSER: RADIATION AND HEALTH PRINCIPLES AND PRACTICE IN THERAPY AND DISASTER PREPAREDNESS

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 10, Oct 86, pp 68-72

[Article by I. A. Gusev and A. K. Guskova]

[Abstract] This book on radiation medicine consists of three major sections and 14 appendices. The body of the book consists of 121 pages, while the appendices are represented by another 80 pages. The book covers all aspects of radiation physics, types of radiation, biological effects, dosimetry, biophysical mechanisms of action, radiosensitivity, and late sequelae, such as neoplasia, cataracts, and mental disorders. The authors underscore the need for nuclear disarmament, an area of endeavor in which the USSR plays a leading role. This book should be translated into Russian, perhaps with some abbreviation of the text.

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CLINICAL AND PATHOGENIC ASPECTS OF RADIATION INJURY DUE TO PRODUCTS OF NUCLEAR FISSION

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 10, Oct 86
(manuscript received 29 Jul 86) pp 68-72

[Article by I. Ya. Vasilenko, professor, Institute of Biophysics, USSR Ministry of Health]

[Abstract] A review is presented of the clinical and pathogenetic sides of radiation injury due to nuclear fission products, noting that the manifestations are dependent on external and internal radiation exposure. Radionuclides entering the body via various routes constitute a special

hazard. Initially, radioactive iodine presents the most serious threat, followed by cesium, strontium, and cerium in subsequent stages. Groups at special risk are children and pregnant women. Initial measures should be taken to minimize radiation exposure and ingress of radionuclides into the body in accordance with dosimetric information. Special measures have to be directed at protection of the thyroid gland with administration of KI , and exclusion of radioactive iodine intake with fresh milk and leafy vegetables. In the second stage, primary danger is posed by foodstuff obtained from contaminated fields, requiring, again, special measures for the protection of agricultural products. Both early effects and late sequelae involve metabolic and endocrine processes, and immune disorders. The latter category also encompasses enhanced risk of neoplasia. References: 21 Russian.

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STORY OF FISHERMAN AND FISH: FACT AND FICTION (PROBLEM IN SEARCH OF ANSWER)

Moscow MEDITSINSKAYA GAZETA in Russian 1 Oct 86 p.3

[Article by B. Lyanov, TASS special correspondent for "Meditinskaya Gazeta"]

[Text] This is the sad story about how responsible leaders are snubbing the services of the "golden fish", which does not promise a wooden trough or the title of nobility, but the most precious of commodities--health. Just one moonfish is literally saturated with tetrodotoxin, an extremely valuable preparation for studying the function of nerve cells. One gram of this substance goes for 176 thousand West German marks on the world market.

"The inhabitants of the sea produce an enormous quantity of proteins, fats and vitamins every second", notes Doctor of Pharmaceutical Sciences I. Azhgikhin, head of Biologically Active Substances Laboratory of the All-Union Scientific Research Institute of Biotechnology. "Marine organisms can provide us with several medicines and other preparations which have so far not been found on dry land. Just looking at them, we haven't even the slightest inkling of where the many tablets and health powders come from. Obtained from algae, sponges and saltwater fish, they are for the most part of foreign origin."

Tetrodotoxin--a powerful anesthetic--was tested forty years ago in Japanese clinics. It is extracted from the fugu, a globefish found in the seas of the Far East. Preparations extracted from algae which help in treating gastrointestinal diseases are well-known abroad.

Scientists at the biologically active substances laboratory were the first to develop methods for the comprehensive application of toxic marine organisms which make it possible to obtain biotoxins and toxin-free tissue in one production cycle. Work aimed at creating a new agent for correcting fat metabolism, preventing thrombosis and treating cardiac ischemia has already been underway at the laboratory for several years.

In short, biologically active substances from marine organisms represent a prime source for the development of new drugs. They give researchers the unique chance to probe the hidden secrets of living cells, and represent real pharmacological tools which enable scientists to make important discoveries relating to the molecular foundations underpinning the activity of the nervous system and the vascular system of the heart.

Work in this promising area was initiated simultaneously in many developed countries. Foreign specialists have forged far ahead, however, as the "marine preparations" developed by them are currently finding broad application in scientific studies and medical practice. The lack of importance placed on anything new and the slowness to act exhibited by leaders in a number of ministries, departments and scientific establishments have combined to keep our country behind on this front. Confirmation of this fact can be found in the difficulties encountered by the laboratory headed by professor I. Azhgikhin.

The Soviet Ministry of Fisheries saw the unmarketable and toxic dwellers of the seas and oceans much like a fish bone that lodged itself in its collective throat, and showed little concern about them. Involved in non-mainstream research, the biologically active substances laboratory in Moscow was therefore all but ignored as part of the institute for this branch of industry. In fact, the only reason why the Ministry was unable to shut down this lab at all was because studies of biologically active substances in the sea were included on the list of the most important experimental development projects of the State Committee on Science and Technology.

Just as soon as the time seemed ripe, however, the Soviet Ministry of Fisheries got rid of the persistent and demanding scientists. The laboratory was shifted to the All Union Institute of Scientific Research for Biological Engineering, a move made entirely without any forethought whatsoever. Barely three months later, another order was handed down, this time to include the laboratory as part of another institute--the All Union Scientific Research Institute for Biotechnology. I. Azhgikhin and his colleagues pondered, weighing the consequences of such a decision. On the one hand, the move seemed reasonable enough. After all, they would now be under the jurisdiction of the branch of industry responsible for the end result--the production of drugs. The scientists could not help but have their reservations, however. What about raw material for the experiments? The former manager had left "his" institute high and dry in that respect.

It was soon explained that attention should not be focused on the future, but squarely on the present--and that present provided no grounds for rejoicing. The workers all continued to toil away in the same basement of the living quarters, and the equipment promised them was not forthcoming. The laboratory staff was dwindling right before their very eyes, as the ranks were "cut" during the first change and again during the second. The situation became paradoxical.

"Several research officers were cut from our staff", explains I. Azhgikhin, "and replaced by workers and lab technicians. Will someone please tell me just how we can now organize--almost overnight--any kind of serious research and development work aimed at finding a new class of therapeutics and close the considerable gap between us and our western colleagues?"

The Ministry of the Medical and Biological Industry is of course well aware of this gap. Last summer, deputy chairman of the Soviet Council of Ministers V. K. Gusev conducted a meeting attended by the Ministry of

Fisheries, the Ministry of Health and the Ministry of the Medical and Microbiological Industry. They slated a deadline of one month for resolving all problems which have so far hampered efforts at initiating the production of agents for use in the battle against poisoning.

It is now three months later to the day, and still nothing has been done. Only after being told to cut the red tape or face the consequences were employees at the Ministry of the Medical and Biological Industry finally prodded into action. Immediately thereafter, they provided a new building and had new equipment installed. Minister V. Bykov and ministry board chief N. Volkov did visit the laboratory, but many questions remain unanswered.

The staff directors for this branch of industry did not follow through on their promise to man the laboratory, so there is no one there to launch any serious research. Even the permanent staff let go during the reorganization has not been reinstated. There are no instruments either, and drugs simply cannot be manufactured without spectrophotometers or chromatographs. The scientists do not even have the most basic analytical scales at their disposal.

Just what does the future hold? Can a single laboratory be expected to handle the enormous tasks confronting it? New ways of integrating science and production are needed for initiating the production of therapeutics on a broad scale--perhaps the interdepartmental scientific and technical complexes currently being organized across the country would be one way to go.

The preconditions necessary to this end to exist. As early as ten years ago, the laboratory proposed a plan for the comprehensive processing of unmarketable sea organisms based on a waste-free technology. This plan not only envisages the production of valuable therapeutics, but the use of protein, feed and industrial fats for the needs of agriculture and industry after the fish and algae have been processed.

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INSTALLATION FOR AUTOMATED PROCESSING OF BIOMECHANICAL INFORMATION

Moscow ORTOPEDIYA TRAVMATOLOGIYA I PROTEZIROVANIYE in Russian No 7, Jul 85
(manuscript received 14 May 84) pp 65-66

[Article by V. Ye. Belenkiy, L. A. Savelev and A. S. Yermolayev, Central
Institute of Traumatology and Orthopedics imeni N. N. Priorov (Director -
Professor Yu. G. Shaposhnikov), Moscow]

[Abstract] A biomechanical installation is described in which all information
obtained in the process of an examination is recorded on magnetic tape, then
processed on a computer. The installation consists of a transducer which
records the time parameters of walking, the reactions of the legs during
standing and walking, an amplifier, 32-channel analog-digital converter,
oscilloscope, buffer memory device and magnetic tape drive.

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